z/OS

Infoprint Server User's Guide

S544-5746-03

z/OS

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Note
Before using this information and the product it supports, be sure to read the general information in “Notices” on page 209.

Fourth Edition (April 2002)

This edition is a major revision of S544-5746-02. It applies to z/OS Version 1 Release 2, Program Number 5694-A01; to z/OS.e Version 1 Release 3, Program Number 5655-G52; to Infoprint Server Transforms Version 1 Release 1 Modification Level 1, Program Number 5697-F51; and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Be sure to use the correct edition for the level of the product.

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Contents

Figures

Tables

Summary of Changes

Summary of Changes
for S544–5746-03
z/OS™ Version 1 Release 2

The book contains information previously presented in S544-5746-02, which supports z/OS Version 1 Release 2.

This book describes functions that have been added in PTFs after the initial release of z/OS V1R2. Ensure that your installation has applied the following Infoprint Server PTFs; otherwise, some information in this book might not be accurate for your system.

- PTF UW85178
- PTF UW87698
- PTF UW88108
- PTF UW88209

New Information

- Batch applications can now use the new Print Interface subsystem. The Print Interface subsystem can automatically transform data from one data format to another before writing the output to the JES spool. The following sections describe this support:
  - "Transforming Output Data" on page 111 compares the different methods you can use to transform data, including the Print Interface subsystem.
  - "Transforming Data Using the Print Interface Subsystem" on page 112 describes how to use the Print Interface subsystem.
  - "JCL Parameters for the Print Interface Subsystem" on page 137 describes how to code the required SUBSYS parameter on the DD JCL statement.
  - The following JCL examples show how to use the Print Interface subsystem:
    - "Print Line or AFP Data on a PostScript Printer Using the Print Interface Subsystem" on page 149
    - "Print PostScript, PCL, or PDF Data on an IBM AFP Printer Using the Print Interface Subsystem" on page 150
  - Appendix A, "Job Attributes and JCL Parameters Valid for Different Printer Types" on page 189 lists the JCL parameters for which the administrator can specify supported values. Before the Print Interface subsystem accepts data sets to print, it validates that the values specified in these JCL parameters are supported values.
  - Appendix B, "JCL Parameters and Corresponding Job Attributes" on page 191 lists all Infoprint Server job attributes that you can specify when you use the Print Interface subsystem, including those that do not have corresponding JCL parameters.
- Infoprint Port Monitor Version 2.0.0 can run on the Windows XP and Windows Me systems, in addition to Windows 95/98, Windows NT, and Windows 2000 systems. The following sections describe Infoprint Port Monitor Version 2.0.0:
  - "Installing Infoprint Port Monitor for Windows" on page 168 describes how to install the Infoprint Port Monitor.
  - "Adding a Local Printer and Configuring the Infoprint Port Monitor for Windows" on page 170 describes how to add a Windows printer and configure an Infoprint Port, including how to select the new **Unattended port** option.

- "Uninstalling the Infoprint Port Monitor for Windows" on page 177 describes how to uninstall the Infoprint Port Monitor.

- Chapter 3, "Using Job Attributes" on page 83 describes three new Infoprint Server job attributes that let you specify the data set name, job ID, and job name for data sets that Infoprint Server creates to print your documents. The data set name is used as the name of an the e-mail attachment when you send a document to an e-mail destination instead of to a printer.
  - **sysout-dataset-name**
  - **sysout-job-id**
  - **sysout-job-name**

Deleted Information

- Infoprint Port Monitor Version 2.0 no longer writes temporary files; therefore, information about how to specify a directory for Port Monitor temporary files has been removed.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of Changes
for S544–5746-02
z/OS Version 1 Release 2

The book contains information previously presented in S544-5746-01, which supports z/OS Version 1 Release 2.

New Information

- Information is added to indicate this book supports z/OS.e™.
- IP PrintWay™ now lets you send print output to an e-mail destination instead of to a printer. The following sections describe how to print to an e-mail destination using different print submission methods:
  - **lp** command:
    - "Sending a File to an E-mail Destination" on page 54
    - "Send Files to an E-mail Destination" on page 58
  - DD and OUTPUT JCL statements:
    - "Sending Output to an E-mail Destination" on page 108
    - "Send Line Data to an E-mail Destination as Text Data" on page 146
    - "Send Line or AFP Data to an E-mail Destination as PDF Data and Print the AFP Data on an AFP Printer" on page 147
    - "Send Line or AFP Data to an E-mail Destination as AFP Data" on page 147
  - AOPPRINT JCL procedure:
    - "Sending a File to an E-mail Destination" on page 151
    - "Send a File to an E-mail Destination" on page 154
  - VTAM® applications: "Sending Output to an E-mail Destination" on page 166
  - Windows systems: "Sending a File to an E-mail Destination" on page 175
  - Non-Windows remote systems: "Sending a File to an E-mail Destination" on page 182
- "title-text" on page 103 describes the **title-text** job attribute, which you can now use to specify a title for an e-mail and a title that a printer's LPD can print on a separator page.

- "JCL Parameters for Printing with IP PrintWay" on page 116 describes the TITLE JCL parameter, which you can now use to specify a title for an e-mail and a title that a printer's LPD can print on a separator page.
- A new appendix describes accessibility features of Infoprint® Server and Infoprint Server Transforms.

Changed Information

- "Printing from a Novell NetWare Client" on page 188 describes how to print from Novell NetWare without using LANRES. z/OS no longer supports LANRES.
- The term ″UNIX files″ is now used instead of ″HFS files″ to refer to files that are in any type of hierarchical file system. UNIX® files include files in a DFSMS Hierarchical File System (HFS), a Network File System (NFS), a temporary file system (tfs), the zSeries™ File System (zFS), and so on.
- This book is no longer divided into parts.

Deleted Information

- The glossary has been removed and is now located in *z/OS Infoprint Server Customization*.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

Summary of Changes
for S544–5746-01
z/OS Version 1 Release 2

The book contains information previously presented in S544-5746-00, which supports z/OS Version 1 Release 1.

New Information

- NetSpool now can convert VTAM application print data to PCL format for printing on PCL printers. The following sections describe this new support:
  - Chapter 7, "Printing from VTAM Applications" on page 161
  - Appendix C, "NetSpool Support for SCS Code Points" on page 193 describes which SCS code points NetSpool supports when it converts SCS data streams to PCL data streams.
  - Appendix D, "NetSpool Support for 3270 Data Streams Code Points" on page 203 describes which 3270 code points NetSpool supports when it converts 3270 data streams to PCL data streams.
- Print Interface and IP PrintWay now provide enhanced copy support:
  - The **copies** job attribute now lets you specify more than 255 copies, as described in "copies" on page 88.
  - IP PrintWay now can print multiple copies on remote printers that either contain an LPD or support the direct sockets printing protocol. Restrictions about printing copies on these types of printers have been removed.
- "Transform and Print Data Sets" on page 160 shows the JCL required to transform data, save the transformed output to a file, and print the file in the same job.
- The SAP to AFP transform now supports SAP R/3 Release 4.6C, as well as earlier SAP R/3 releases. The SAP to AFP transform produces monochrome output only.

- The AFP to PCL, AFP to PDF, and AFP to PostScript transforms do not support IOCA Color Plus image objects (IOCA FS45), which was recently added to the AFP architecture. Also, the AFP to PCL transform does not support scaling of fonts.

  The following sections describe these limitations:
  - "afp2pcl—Transform AFP or Line Data to PCL Data" on page 28
  - "afp2pdf—Transform AFP or Line Data to PDF Data" on page 35
  - "afp2ps—Transform AFP or Line Data to PostScript Data" on page 42
- "Using the print Command" on page 176 describes how to use the Windows **print** command to print a file to Infoprint Server.
- Chapter 4, "Printing from Batch Applications Using DD and OUTPUT JCL Statements" on page 107 describes how to specify the DSNAME parameter on the DD JCL statement. The DSNAME parameter can help you to identify your printed output and locate your output data sets on the JES spool.

Changed Information

- The **lp** command lets you print only one file at a time if the data must be transformed from one format to another before printing or if files have different data formats. "lp—Print a File" on page 51 describes these limitations.
- The **lpstat** command lets you specify the **-a**, **-o**, **-p**, and **-u** options multiple times. Also, to specify more than one value in these options, you must enclose the values in quotation marks. "lpstat—Show Printer Names and Locations and Status of Print Jobs" on page 60 describes these considerations.
- When you use a z/OS UNIX command to transform data to or from the AFP data stream format and you want to write the output to an MVS data set, you must allocate and catalog the data set prior to running the transform command. If you use the AOPBATCH procedure to run the transform command, you can allocate the output MVS data set in the AOPBATCH job. The following sections describe this requirement:
  - "afp2pcl—Transform AFP or Line Data to PCL Data" on page 28
  - "afp2pdf—Transform AFP or Line Data to PDF Data" on page 35
  - "afp2ps—Transform AFP or Line Data to PostScript Data" on page 42
  - "pcl2afp—Transform PCL Data to AFP Data" on page 65
  - "pdf2afp and ps2afp—Transform PDF or PostScript Data to AFP Data" on page 69
  - "sap2afp—Transform SAP OTF or ABAP Data to AFP Data" on page 78
  - "AOPBATCH DD Statements" on page 158

Deleted Information

- The AFP Printer Driver and AFP Viewer are no longer shipped with Infoprint Server; therefore, information about how to install them has been removed. However, you can continue to download these programs from the Web at:

  `http://www.ibm.com/printers/download.html`
- You can no longer view **man** pages or receive messages in Spanish; therefore, information about Spanish **man** pages and messages has been removed.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

About This Publication

This publication describes how to print jobs using the following products:

- Infoprint Server, an element of z/OS Version 1 Release 2 (5694–A01) and z/OS.e Version 1 Release 3 (5655-G52)
- Infoprint Server Transforms Version 1 Release 1 Modification Level 1, a separate IBM program product (5697-F51)

With these products, you can perform the following tasks:

- Submit jobs to Infoprint Server from the following operating systems:
  - z/OS UNIX System Services
  - z/OS, using Job Control Language (JCL)
  - z/OS, using Virtual Telecommunications Access Method (VTAM) applications

    Note: The term VTAM refers to the z/OS Communications Server SNA Services element of z/OS.
  - The following remote systems with Transmission Control Protocol/Internet Protocol (TCP/IP) installed:
    - Windows®
    - Advanced Interactive Executive (AIX®)
    - IBM® Operating System/2® (OS/2®)
    - OS/390® or z/OS
    - Virtual Machine (VM) or z/VM™
    - OS/400®
    - Novell NetWare
- Query printer names, printer locations, or print job status
- Cancel print jobs
- Transform print jobs to the Advanced Function Presentation (AFP™) data stream using z/OS UNIX System Services commands
- Transform print jobs from the Advanced Function Presentation (AFP) data stream using z/OS UNIX System Services commands

Who Should Use This Publication

This publication is intended for anyone who prints or transforms jobs using Infoprint Server.

How This Publication is Organized

This publication is divided into the following chapters:

- Chapter 1, “Introducing Infoprint Server” on page 1 gives an overview of Infoprint Server.
- Chapter 2, “Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 23 describes the commands that are used to perform the following tasks:
  - Submit jobs to Infoprint Server from z/OS UNIX System Services
  - Query jobs and printer definitions
  - Cancel jobs

  - Transform jobs to the AFP data stream
  - Transform jobs from the AFP data stream
- Chapter 3, “Using Job Attributes” on page 83 lists the Infoprint Server attributes that describe jobs and the documents in them and explains how to use these attributes.
- Chapter 4, “Printing from Batch Applications Using DD and OUTPUT JCL Statements” on page 107 describes how to use standard JCL to submit batch jobs to Infoprint Server from z/OS.
- Chapter 5, “Printing Using the AOPPRINT JCL Procedure” on page 151 describes a JCL procedure for submitting batch print jobs to Infoprint Server from z/OS.
- Chapter 6, “Transforming Data With the AOPBATCH Program” on page 157 describes how to use standard JCL to submit batch transform jobs to Infoprint Server.
- Chapter 7, “Printing from VTAM Applications” on page 161 describes concepts that users of VTAM applications, such as Customer Information Control System (CICS®) or Information Management System (IMS™), must understand to use Infoprint Server.
- Chapter 8, “Printing from Windows Systems” on page 167 describes how to submit jobs to Infoprint Server from a Windows workstation and how to install the Infoprint Port Monitor for Windows.
- Chapter 9, “Printing from Remote Non-Windows Systems” on page 181 describes how to submit and query jobs from remote AIX, OS/2, OS/390, z/OS, VM, z/VM, and Novell NetWare clients.
- Appendix A, “Job Attributes and JCL Parameters Valid for Different Printer Types” on page 189 shows whether job attributes and JCL parameters are validated for individual printers.
- Appendix B, “JCL Parameters and Corresponding Job Attributes” on page 191 lists parameters of the OUTPUT and DD JCL statements and the Infoprint Server job attributes that correspond to them.
- Appendix C, “NetSpool Support for SCS Code Points” on page 193 and Appendix D, “NetSpool Support for 3270 Data Streams Code Points” on page 203 list the code points in VTAM data streams that Infoprint Server supports.
- Appendix E describes accessibility features of Infoprint Server and Infoprint Server Transforms.

This publication also contains a bibliography and index.

The Infoprint Server glossary is located in *z/OS Infoprint Server Customization*.

Where to Find More Information

This section describes where to find information related to z/OS, Infoprint Server, and Infoprint Server Transforms.

Web Sites

These Web sites contain related information:

- http://www.ibm.com/printers/

  This site contains information about printing products, including:
  - An overview of Infoprint Server, including the same printing scenarios that you can find in *z/OS Infoprint Server Introduction*.

  - Infoprint Server publications and other publications related to printing. These publications are in PDF format.
- http://www.ibm.com/printers/download.html

  This site contains downloads for Windows systems, including the Infoprint Port Monitor, the AFP Viewer plug-in, the AFP Printer Driver, and Network Printer Manager (NPM) for the Web.
- http://www.ibm.com/servers/eserver/zseries/zos/

  This site contains information about z/OS.
- http://www.ibm.com/servers/eserver/zseries/zos/bkserv/

  This site contains z/OS documentation, including:
  - All z/OS publications in both PDF and BookManager format.
  - Documentation updates that result from APARs and PTFs.
- http://ibm.com/redbooks

  This site contains IBM redbooks, including a redbook for Infoprint Server.
- http://www.ibm.com/servers/eserver/zseries/zos/unix/

  This site contains information about z/OS UNIX System Services.

Accessing Licensed Books on the Web

z/OS licensed documentation in PDF format is available on the Internet at the IBM Resource Link Web site at:

`http://www.ibm.com/servers/resourcelink/`

Licensed books are available only to customers with a z/OS license. Access to these books requires an IBM Resource Link Web userid and password, and a key code. With your z/OS order you received a memo that includes this key code.

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To register for access to the z/OS licensed books:

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3. Click on **Access Profile.**
4. Click on **Request Access to Licensed books.**
5. Supply your key code where requested and click on the **Submit** button.

If you supplied the correct key code you will receive confirmation that your request is being processed. After your request is processed you will receive an e-mail confirmation.

Note: You cannot access the z/OS licensed books unless you have registered for access to them and received an e-mail confirmation informing you that your request has been processed.

To access the licensed books:

1. Log on to Resource Link using your Resource Link userid and password.
2. Click on **Library**.
3. Click on **zSeries**.
4. Click on **Software**.
5. Click on **z/OS**.

6. Access the licensed book by selecting the appropriate element.

Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for most of the z/OS, z/VM, and VSE messages you encounter, as well as system abends and some codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

`http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/`

or from anywhere in z/OS where you can access a TSO command line (for example, TSO prompt, ISPF, z/OS UNIX System Services running OMVS). You can also download code from the *z/OS Collection* (SK3T-4269) and the LookAt Web site so you can access LookAt from a PalmPilot (Palm VIIx suggested).

To use LookAt on the Internet to find a message explanation, go to the LookAt Web site and simply enter the message identifier (for example, `$HASP701` or `$HASP*`). You can select a specific release to narrow your search.

To use LookAt as a TSO command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO from a disk on your *z/OS Collection* (SK3T-4269) or from the LookAt Web site. To obtain the code from the LookAt Web site, do the following:

1. Go to http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/.
2. Click **News**.
3. Scroll to **Download LookAt Code for TSO and z/VM.**
4. Click the ftp link, which will take you to a list of operating systems. Click the appropriate operating system. Then click the appropriate release.
5. Open the **lookat.me** file and follow its detailed instructions.

After you have LookAt installed, you can access a message explanation from a TSO command line by entering: **lookat** *message-id*. LookAt will display the message explanation for the message requested.

Note: Some messages have information in more than one book. For example, IEC192I can be found in *z/OS MVS System Messages, Vol 7 (IEB-IEE)* and also in *z/OS MVS Routing and Descriptor Codes*. For such messages, LookAt displays a list of books in which the message appears. You can then select one of the books to view the message explanation.

Preventive Service Planning Information

Before installing Infoprint Server, you should review the current Preventive Service Planning (PSP) information, also called the PSP bucket. You should also periodically review the current PSP information. The PSP upgrade ID is: ZOSV1R2; the subset for Infoprint Server is: INFOPRINT.

To obtain the current PSP bucket, contact the IBM Support Center or use z/OS SoftwareXcel (IBMLink). If you obtained z/OS as part of a CBPDO, HOLDDATA and PSP information is included on the CBPDO tape; however, this information might not be current if the CBPDO tape was shipped several weeks prior to installation.

Publications

See “Bibliography” on page 213 for a list of the publications referred to in this book and publications that contain additional information about related products. For titles and order numbers of the books for *all* products that are part of z/OS, refer to *z/OS Information Roadmap*.

Infoprint Server for z/OS Implementation Redbook, SG24-6234, is available on the Web at: `http://ibm.com/redbooks`

Table 1 summarizes the publications in the Infoprint Server product library.

Table 1. Summary of Infoprint Server Publications

Publication	Form number
z/OS Infoprint Server Introduction Introduces all components of Infoprint Server, including IP PrintWay, NetSpool™, and Print Interface. It also introduces Infoprint Server Transforms. This publication contains printing scenarios that show how you can use Infoprint Server in your installation.	S544-5742
z/OS Infoprint Server Migration Summarizes the new function in Infoprint Server and Infoprint Server Transforms and describes the migration tasks required to implement each new function in your installation. It also describes the Infoprint Server migration program, which converts IP PrintWay, NetSpool, and Print Interface printer information to the format required by Infoprint Server for OS/390 V2R8 and higher.	G544-5743
z/OS Infoprint Server Customization Describes customization tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes customization tasks for Infoprint Server Transforms. This publication describes required environment variables, configuration files, startup procedures, how to write exit routines and filter programs, and how to use the Infoprint Server API.	S544-5744
z/OS Infoprint Server Operation and Administration Describes operator procedures and administrative tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. This publication describes how to start and stop Infoprint Server and how the operator can manage the IP PrintWay transmission queue. It describes how the administrator can create entries in the Printer Inventory using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program, define NetSpool printer LUs to VTAM, and use accounting records written by IP PrintWay.	S544-5745
z/OS Infoprint Server User’s Guide Describes how to submit print jobs from remote systems (including Windows systems), the local z/OS system, and Virtual Telecommunications Access Method (VTAM) applications. It describes these z/OS UNIX commands: **afp2pcl**, **afp2pdf**, **afp2ps**, **cancel**, **lp**, **lpstat**, **pcl2afp**, **pdf2afp**, **ps2afp**, and **sap2afp**; the AOPPRINT JCL procedure; the AOPBATCH program; DD and OUTPUT JCL parameters supported by Infoprint Server; and how to download and install the Infoprint Port Monitor for Windows.	S544-5746

Table 1. Summary of Infoprint Server Publications (continued)

Publication	Form number
z/OS Infoprint Server Messages and Diagnosis Describes messages issued by all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes Infoprint Server Transforms messages and how to use Infoprint Server tracing facilities to diagnose and report errors.	G544-5747

Conventions Used in This Publication

This section explains the conventions that this publication uses for the following:

- Highlighting
- Format notation
- Examples

Highlighting

This publication uses the following highlighting conventions:

Bold Bold highlighting identifies z/OS UNIX System Services and Windows commands, attributes, files, directories, and other items whose names the system predefines, such as **lp** and **/etc/Printsrv/aopd.conf**. In syntax diagrams, it identifies keywords that you must enter exactly as they appear, such as **CLASS**.

UPPERCASE Uppercasing identifies OS/390, z/OS, VM, z/VM, and OS/400 commands, statements, parameters, files, libraries, and other items whose names the system predefines, such as OUTPUT JCL and PRMODE.

Note: There is one exception: the JCL subparameter printer. This subparameter appears in lower case because you should enter it in lower case.

Italic Italic highlighting identifies a variable item whose actual name or value you supply, such as *userid* or *filename*. Italics also identify publication titles.

`Monospace` Monospacing identifies an example.

Format Notation

Format notation uses symbols to show specific conditions. Do not enter the following symbols, unless specifically instructed to do so:

Brackets	[ ]
Brackets and vertical bar	[|]
Braces and vertical bar	{ | }
Underlining	_
Ellipsis	...

These symbols have the following meanings:

- Brackets, [ ], around values indicate that they are optional. For example:

[**-d**]

means that you do not have to enter the **-d** option.

- A vertical bar within brackets, [|], indicates an optional choice between values. For example:

  [**PORTNO=***portnumber* | **PRTQUEUE=***printqueue*]

  means that you can enter the **PORTNO** parameter, the **PRTQUEUE** parameter, or neither, but not both.
- A vertical bar within braces, { | }, indicates a required choice between values. For example:

  {'*hhhh:mm:ss*' | **FOREVER**}

  means that you must enter either a time in hours, minutes, and seconds or the keyword **FOREVER**, but not both.

  Note: A vertical bar that does *not* appear within brackets or braces is the UNIX pipe symbol. Enter it as it appears. For example:

  ```
  ls | lp
  ```

  means that the output of the **ls** command becomes the input to the **lp** command.
- Underlined text identifies the default value that is used if you do not specify a value. For example:

  document

  means that not specifying an output type is equivalent to specifying **document**.
- An ellipsis, ... , means that you can supply more than one occurrence of a keyword or value with the command. For example:

  filename ...

  means that you can enter more than one file name.

Examples

For ease of reading, long examples are broken into several lines. When you enter a command, enter it all on one line. Do not press the ENTER key until you have typed the entire command.

Chapter 1. Introducing Infoprint Server

Infoprint Server and Infoprint Server Transforms provide support for LAN and host printing on your z/OS system. Figure 1 shows how the components of Infoprint Server and Infoprint Server Transforms fit into your system. The components of Infoprint Server and Infoprint Server Transforms are shaded. (When you view the PDF file, the components of Infoprint Server are yellow, and the components of Infoprint Server Transforms are blue.) Following the figure is a description of each component.

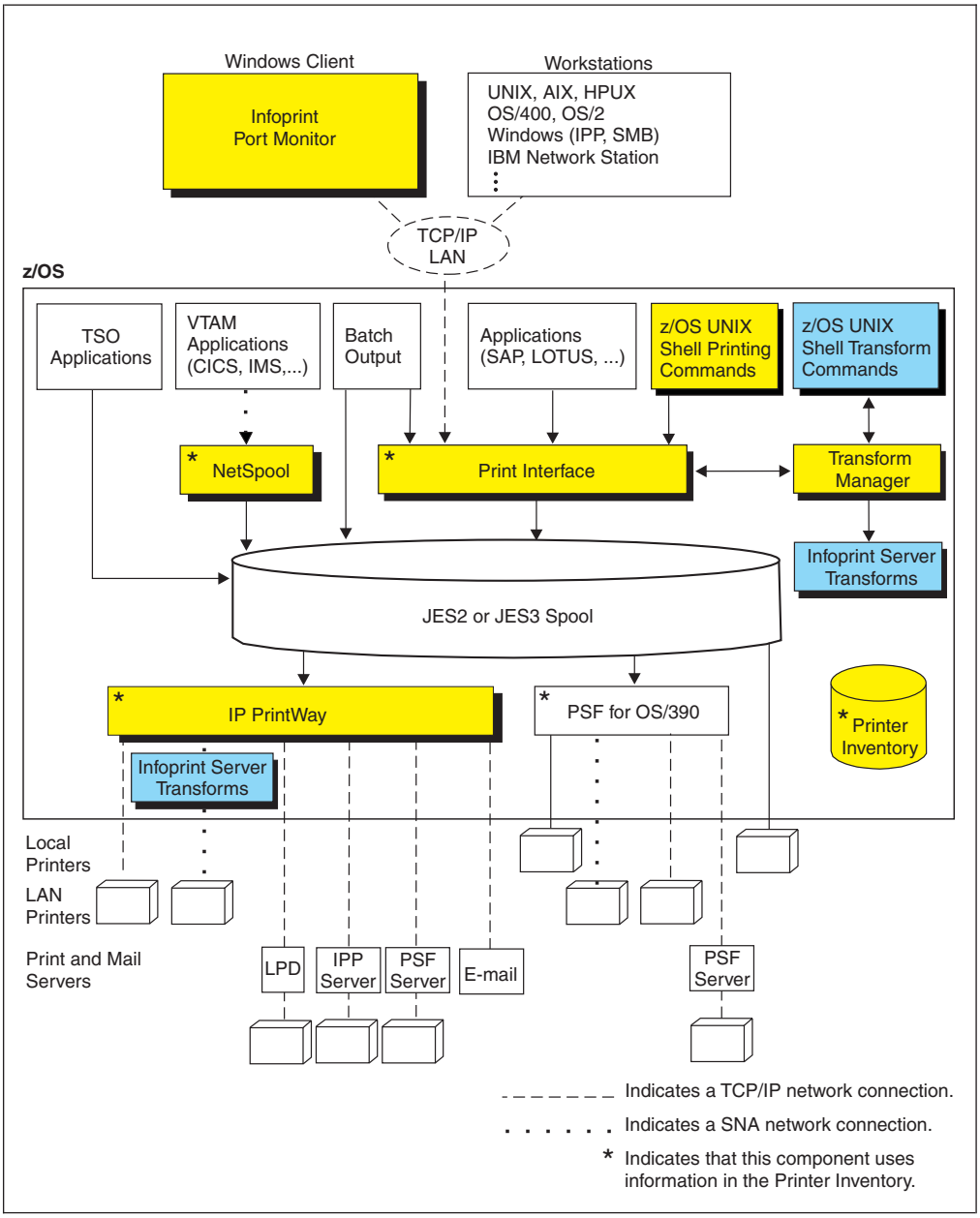

Figure 1. Infoprint Server and Infoprint Server Transforms System Diagram

Printer Inventory and Printer Inventory Manager
The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of files in the hierarchical file system (HFS) that contain information about each printer and each e-mail destination. The Printer Inventory also contains system configuration information for IP PrintWay. Optionally, the Printer Inventory can contain system configuration information for PSF for OS/390.

Infoprint Server Windows Client
The Infoprint Server Windows client consists of the Infoprint Port Monitor, which runs on a Windows system and automatically sends print requests and job attributes to the Print Interface component of Infoprint Server running on the z/OS system.

Print Interface
The Print Interface component of Infoprint Server processes print requests from remote clients and from the local z/OS system. Print Interface accepts several different data formats, converts data between EBCDIC and ASCII, transforms data to a format accepted by the printer, and allocates output data sets on the JES spool.

Infoprint Server Transforms
Infoprint Server Transforms, a separate licensed program product (5697-F51), provides transforms that convert data from one format to another on the local z/OS system.

Transform Manager
The Infoprint Server Transform Manager component of Infoprint Server manages many of the transforms provided by Infoprint Server Transforms.

NetSpool
The NetSpool component of Infoprint Server processes print requests from VTAM applications, such as CICS and IMS. NetSpool accepts SCS, 3270, and binary data streams, converts SCS and 3270 data streams to either line data streams or PCL data streams, and allocates output data sets on the JES spool.

IP PrintWay
The IP PrintWay component of Infoprint Server transmits data sets from the JES spool to printers or print servers in a TCP/IP or SNA network. IP PrintWay also can transmit data sets to e-mail destinations.

Simple Network Management Protocol (SNMP) subagent (not shown in figure)
The SNMP subagent of Infoprint Server lets you use an SNMP manager to view printer characteristics and printer status for printers controlled by PSF for OS/390 that do not have internal SNMP agents or are not TCP/IP-attached to PSF.

PSF for OS/390 (a separate product)
PSF for OS/390 (5655–B17) is a separate product that can print output on IBM AFP printers. The PSF system programmer can specify PSF printer configuration information in the Printer Inventory that PSF can use when it starts a printer. For information about how to customize PSF to use the Printer Inventory, refer to *PSF for OS/390 & z/OS: Customization*.

The following sections describe each of the Infoprint Server components in more detail.

Printer Inventory Manager

The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of HFS files that contain information about the printing environment. The administrator must create and manage information in the Printer Inventory.

Note: The Printer Inventory *cannot* be shared by Infoprint Server running at the same or different levels on other systems.

The administrator can create the following objects in the Printer Inventory:

- Printer definitions, which contain information about printers and e-mail destinations.
- Printer pool definitions, which contain information about groups of printers and e-mail destinations to which NetSpool can broadcast data.
- FSS definitions, which contain configuration information for IP PrintWay functional subsystems (FSSs). Optionally, the administrator can create FSS definitions for PSF for OS/390 FSSs.
- FSA definitions, which contain configuration information for IP PrintWay functional subsystem applications (FSAs). Optionally, the administrator can create FSA definitions for PSF for OS/390 FSAs.

Figure 2 shows how the administrator can create definitions in the Printer Inventory and which components of Infoprint Server use the Printer Inventory.

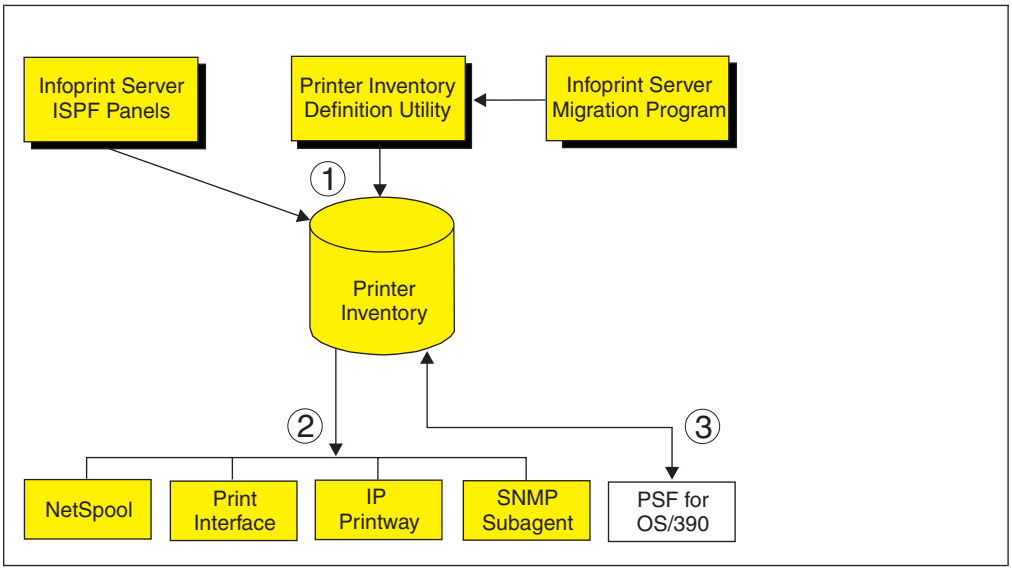

Figure 2. Printer Inventory Manager

1. The administrator can use Infoprint Server ISPF panels and the Printer Inventory Definition Utility (PIDU) to create and maintain the Printer Inventory. The PIDU is useful for creating many printer definitions at the same time and for backing up the Printer Inventory.
2. The following Infoprint Server components use information in the Printer Inventory:
   - NetSpool uses information in printer definitions and in printer pool definitions.
   - Print Interface uses information in printer definitions.

- IP PrintWay uses information in printer definitions. IP PrintWay also uses configuration information in FSS and FSA definitions.
- The SNMP subagent uses printer information that PSF for OS/390 stores in the Printer Inventory about PSF printers.

3. PSF for OS/390, a separate product, can optionally use printer configuration information that the PSF system programmer specifies in FSS and FSA definitions in the Printer Inventory.

   The printer configuration information in the FSS and FSA definitions is the same as the configuration information that the system programmer can alternatively specify in PSF startup procedures and PSF exits. When the printer configuration information is specified in the Printer Inventory, however, the PSF system programmer can change it without restarting all PSF printers in the PSF functional subsystem (FSS); only the PSF printers with changed configuration information need to be restarted.

   For information about how the PSF system programmer can customize PSF for OS/390 to use the Printer Inventory, refer to *PSF for OS/390 & z/OS: Customization*.

Additional functions provided by the Printer Inventory Manager are:

- **Migration program**

  The Infoprint Server migration program helps the administrator migrate from earlier releases of IP PrintWay, NetSpool, and the OS/390 Print Server. The migration program merges printer information formerly specified in NetSpool print characteristics data sets, NetSpool tables, NetSpool startup procedures, IP PrintWay routing and options data sets, and the Print Interface printer inventory to create entries (such as printer definitions and printer pool definitions) in the new Infoprint Server Printer Inventory.

  The migration program can also move printer information located in PSF startup procedures to FSS and FSA definitions in the Printer Inventory.

- **Security**

  The administrator must restrict access to the Printer Inventory and to the operator commands that start and stop the Printer Inventory Manager, the Print Interface LPD, the Print Interface IPP server, the Transform Manager, and the SNMP subagent.

Windows Client

The Infoprint Server Windows client consists of the following program that runs on Windows 95/98, NT, and 2000 systems:

Infoprint Port Monitor for Windows
The Infoprint Port Monitor for Windows lets users print documents using standard print-submission methods from any Windows application that supports printing. After the Infoprint Port Monitor for Windows is installed and configured on the Windows system, the Port Monitor automatically sends documents to the Print Interface component of Infoprint Server.

Note: Infoprint Server also supports printing from a Windows system with the SMB protocol and the IPP protocol. To use these protocols, Windows users do not need to install the Infoprint Port Monitor for Windows.

The following related products also run on Windows 95/98, NT, and 2000 systems. Although they are *not* part of the Infoprint Server Windows client, you might want to use them if your installation has IBM AFP printers or AFP documents.

- **AFP Printer Driver for Windows**

  The AFP Printer Driver creates output files in AFP format. Files in AFP format can be printed on IBM AFP printers. The AFP Printer Driver can create output files that contain documents, overlays, or page segments. It can also create inline form definitions for printing documents with special options, such as printing on both sides of the paper.
- **AFP Viewer Plug-in for Windows**

  The AFP Viewer plug-in lets you view documents in AFP format, for example documents downloaded from the z/OS system or documents on the Web. The AFP Viewer plug-in also lets you print AFP documents to IBM AFP printers as well as non-AFP printers.

The Infoprint Port Monitor for Windows is shipped with Infoprint Server. You can also download the Infoprint Port Monitor for Windows, the AFP Printer Driver for Windows, and the AFP Viewer plug-in for Windows directly to your Windows systems from the IBM Printing Systems Division (PSD) Web site: http://www.ibm.com/printers/download.html.

Print Interface

The Print Interface component of Infoprint Server processes print requests received from both remote clients and local users. Figure 3 on page 6 shows the steps that occur from the time Print Interface receives a print request until it allocates an output data set on the JES spool. An explanation of each step follows.

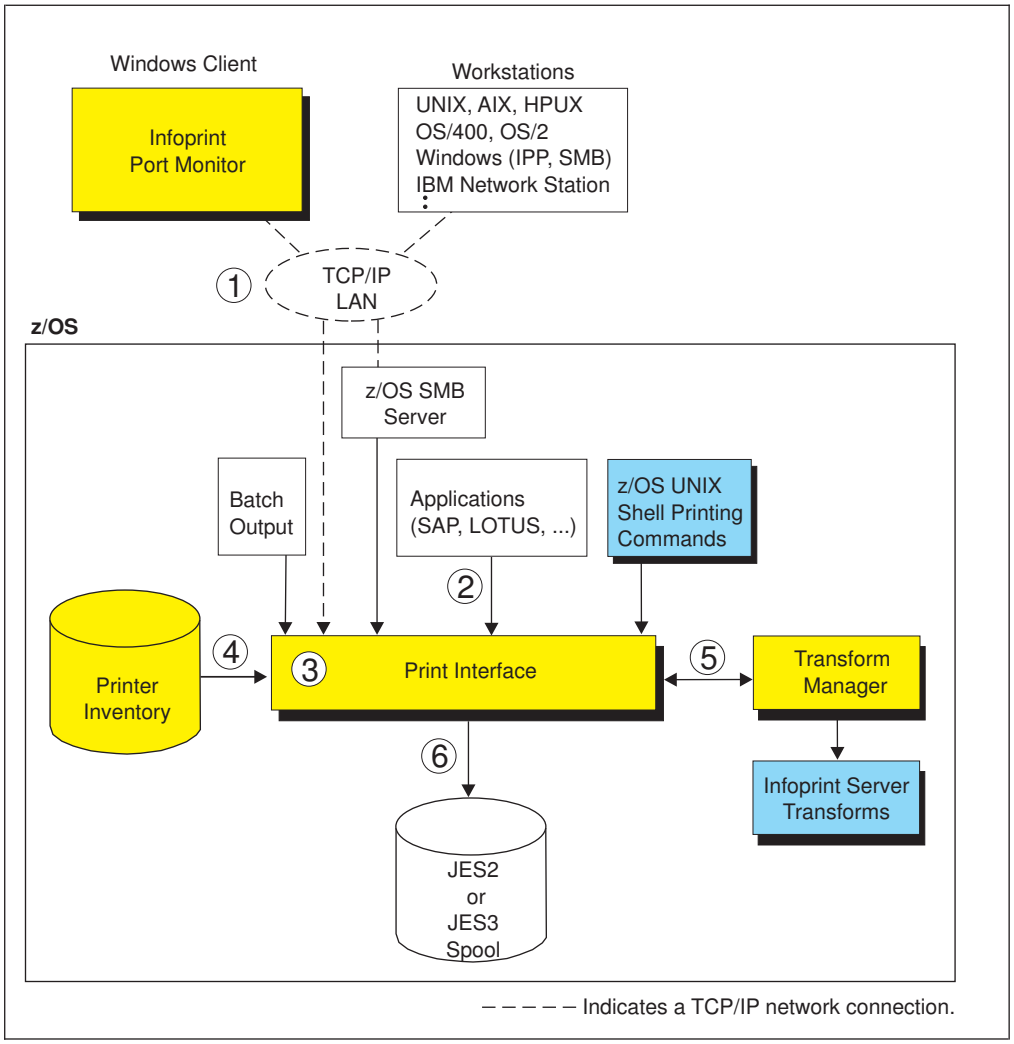

Figure 3. Print Interface System Diagram

1. Users can submit print requests and query job status from remote clients in the TCP/IP network, using one of the following TCP/IP protocols:
   - LPR protocol: The LPR protocol is defined by RFC 1179. Clients that use this protocol include:
     - The Infoprint Port Monitor for Windows; Infoprint Server provides this client.
     - TCP/IP commands such as **lpr**, **enq**, and **lpq**.
     - An SAP R/3 application server that runs on a remote system.
   - Internet Printing Protocol (IPP): IPP is a standard protocol for printing over the Internet. An IPP client must run in the remote system.
   - Server Message Block (SMB) printing protocol: SMB is the standard printing protocol used by Windows systems. The z/OS SMB server must be installed on the z/OS system to receive print requests. The z/OS SMB server uses Print Interface callable services to allocate output data sets on the JES spool and return print job status to the client.
2. Users can submit print requests from the local z/OS system using one of the following methods:

- Print Interface subsystem: Using the Print Interface subsystem, you can transform and print output data created by a batch application with minimal changes to your JCL.
- AOPPRINT: Using the AOPPRINT JCL procedure, you can print existing MVS data sets and UNIX files.
- z/OS UNIX printing commands (**lp**, **lpstat**, and **cancel**) provided by Infoprint Server; Using these commands, which adhere to the XPG4.2 standard, you can print MVS data sets and UNIX files, query the status of a print job, and cancel a print job. You can run these commands from the z/OS UNIX command line or from a UNIX application.
- Infoprint Server SAP Output Management System (OMS). Using the Infoprint Server SAP OMS and the SAP R/3 Application Server for z/OS, SAP R/3 users can submit a print job and receive immediate notification about job events.

3. Print Interface runs as a UNIX application that uses the services of z/OS UNIX System Services.

   Print Interface accepts data in any format, including but not limited to the following formats: line data, MO:DCA-P (also known as AFP), PostScript, PDF, PCL, SAP (OTF and ABAP), and text.

4. Each print request specifies the name of a printer definition in the Printer Inventory. The printer definition can describe a printer or an e-mail destination. Print Interface uses information in the printer definition to determine how to process the data, whether or not to transform the data, and so on.
5. Print Interface can, in most cases, automatically detect the data format of the input data and validate that the printer accepts that data format. Print Interface can convert data to EBCDIC or ASCII. It can also call transforms provided by Infoprint Server Transforms to convert data from one data format to another.
6. For each print request, Print Interface dynamically allocates an output data set on the JES2 or JES3 spool using JES allocation parameters specified in the printer definition, including:
   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 uses these parameters when printing data on IBM AFP printers.

Some additional functions provided by Print Interface include:

- **Validation of print requests**

  Before accepting print requests, Print Interface can validate, with some exceptions, that the document can print as requested on the selected printer. For example, Print Interface can reject documents with data formats that the printer does not support or that are too large to print on the selected printer.

- **Automatic data transforms**

  Print Interface can, in most cases, automatically detect the input data format and transform data into the format required by the printer or e-mail destination. Print Interface can perform the following data transforms:

  – Print Interface can transform line data (for example, in a sequential data set or a partitioned data set) into text data for printing on a printer such as an IBM network printer.

- Print Interface can transform text data into line data for printing on an IBM AFP printer.
- Print Interface can transform PCL, PostScript, PDF, and SAP (OTF and ABAP) data into AFP or line data for printing on an IBM AFP printer. The Infoprint Server Transforms product is required.
- Print Interface can transform line data or AFP data into PCL, PostScript, or PDF format. Infoprint Server Transforms is required.
- Print Interface can transform PCL, PDF, and PostScript data to AFP format on an AIX or Windows system. Infoprint Manager V3R2 for AIX or Infoprint Manager V1R1 for Windows NT and Windows 2000 is required. Print Interface can use the color transform provided with Infoprint Manager V3R2 for AIX to transform color PDF and PostScript data to AFP format for printing on an IBM Infoprint Color 130 Plus printer.

- **Notification of completion**

  Print Interface can notify users on the local z/OS system when processing of a document is complete and the data set has been removed from the JES spool. It can also notify users who request mail notification with a command, such as **lpr**, that uses the LPR to LPD protocol.

- **Status reporting**

  Print Interface can report the status of its data sets that are still on the JES spool. It can report if the data set has been selected for processing, held by the system, retained due to a failed transmission to a LAN printer or an e-mail destination, or deleted before printing.

- **Identification of printed output**

  Print Interface retains the user ID of the job submitter for printing on separator pages and for display on the JES spool, so that the user ID can be printed on separator pages and the operator can view the name of the job submitter when the data set is on the JES spool.

- **Double-byte character set (DBCS) support**

  Print Interface can convert DBCS data from one code page to another before writing the data to the JES spool.

- **Filter support**

  An installation can write a filter program to modify data before Print Interface writes the data to an output data set. A filter can be used to add a separator page or modify data. For example, an installation can write a filter to transform data from one format to another.

- **SAP Output Management System (OMS)**

  Print Interface provides an SAP OMS with a Callback daemon to support printing with the SAP R/3 Application Server for z/OS. The OMS and Callback daemon let SAP users print, cancel jobs, obtain job status, and receive immediate notification about job events.

  The SAP-certified functions provided in Print Interface are:

  - OMS Polling Interface
  - OMS/XOM Callback Interface
  - OMS Operations Supplement

  For more information about SAP certification, visit the SAP Web site at `www.sap.com/solutions/compsoft/cspdirectory`. “Print Interface with an SAP R/3 Application Server Running on the Same z/OS System” on page 9 describes this support.

The Print Interface LPD can print documents received from an SAP R/3 application server running on another system, such as an AIX or Windows NT system. “Print Interface with the SAP R/3 Application Server Running on a Remote System” on page 10 describes this support.

Print Interface with an SAP R/3 Application Server Running on the Same z/OS System

Figure 4 shows how the Print Interface SAP Output Management System (OMS), Callback daemon, and the SAP R/3 Application Server for z/OS fit into your system. When an SAP R/3 application server runs on the z/OS system, the Print Interface OMS receives print and status requests, and the Callback daemon provides immediate notification of job events. The SAP R/3 Application Server for z/OS and its spool work process must run on the same system as Infoprint Server. The Print Interface Callback daemon can return notification of job events to SAP R/3 application servers running on *other* SAP R/3 systems, provided that the SAP spool work process runs on the z/OS system.

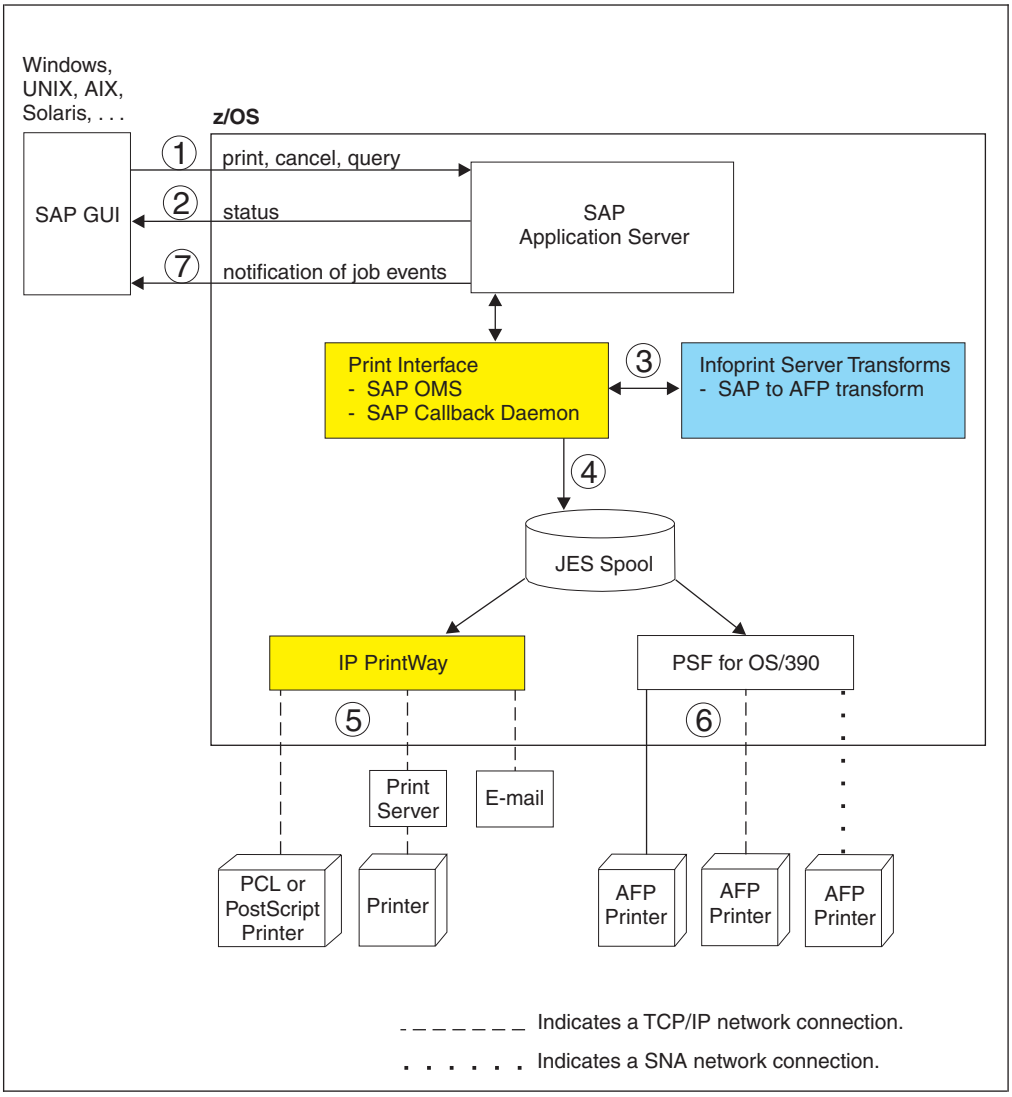

Figure 4. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a z/OS System

1. From an SAP GUI, users make print, cancel, job query, and device query requests to the SAP R/3 Application Server. These print requests specify the name of an SAP R/3 output device defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.
2. For a status request, the Print Interface SAP OMS returns the status of a print job or a list of print jobs that the printer is processing.
3. For a print request, Print Interface detects the data format of the input document and performs different processing depending on the type of data:
   - If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must specify the correct transform filter in the printer definition to use transforms.
   - If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data; however, the administrator can specify a filter that modifies data in the printer definition.
4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document.
5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers, print servers, or e-mail destinations.
6. PSF for OS/390 selects data sets from the JES spool and prints them on IBM AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.
7. As print jobs complete (successfully or unsuccessfully), the Print Interface SAP Callback daemon sends notification back to the SAP R/3 system.

Print Interface with the SAP R/3 Application Server Running on a Remote System

Figure 5 on page 11 shows how the Print Interface LPD and an SAP R/3 application server running on a remote system (such as AIX or Windows NT) fit into your system. When no SAP R/3 application server is running on the z/OS system, the Infoprint Server LPD (as opposed to the Infoprint Server OMS) receives print and status requests, and notification of job events does not occur.

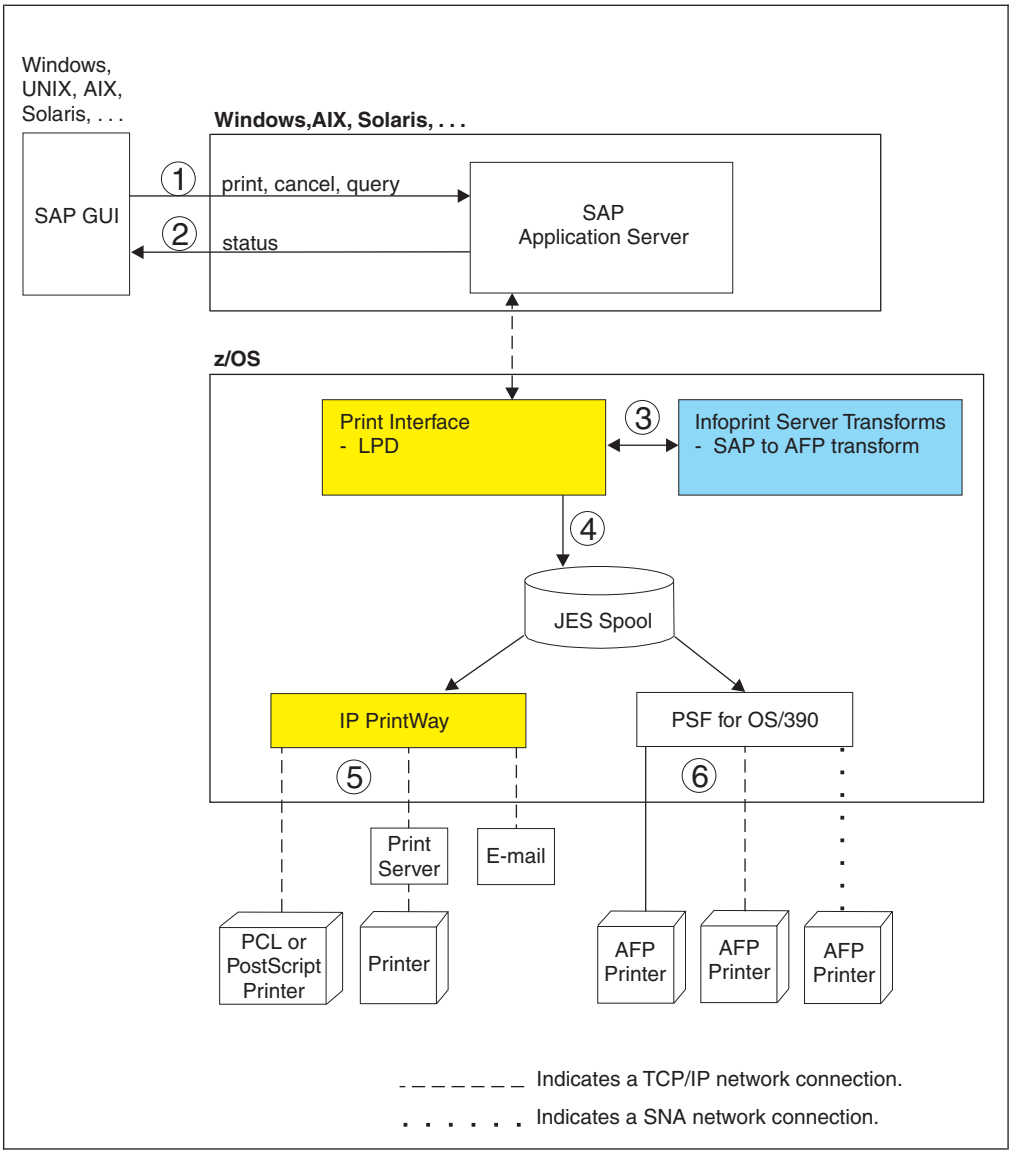

Figure 5. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a Non-z/OS System

1. From an SAP GUI, users make print, cancel, job query, and device query requests to an SAP R/3 application server running on a remote system (such as Windows NT, AIX, or Solaris. These print requests specify the name of an SAP R/3 output device that is defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.
2. For a status request, the Print Interface LPD returns the status of a print job or a list of print jobs that the printer is processing.
3. For a print request, the Print Interface LPD detects the data format of the input document and performs different processing depending on the type of data:
   - If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must configure the printer definition to use transforms and specify transform options.

- If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data; however, the administrator can specify a filter that modifies data in the printer definition.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document, or IP PrintWay can send it to an e-mail destination.
5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers or print servers or sends them to e-mail destinations.
6. PSF for OS/390 selects data sets from the JES spool and prints them on IBM AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.

Infoprint Server Transforms

Infoprint Server Transforms is a licensed program product (5697-F51). It provides transforms that convert data from one format to another on the z/OS system. Infoprint Server Transforms consists of the following features:

- **Transforms to AFP**

  This feature consists of the following transforms that convert data streams to monochrome Mixed Object Document Content Architecture for Presentation (MO:DCA-P) data streams, which can be printed on IBM AFP printers:

  – PCL to AFP Transform

    This transform converts Printer Control Language (PCL) 5e data streams to MO:DCA-P data streams.

  – PDF to AFP Transform

    This transform converts Adobe Portable Data Format (PDF) 1.2 data streams to MO:DCA-P data streams.

  – PostScript to AFP Transform

    This transform converts PostScript Language Level 3 data streams to MO:DCA-P data streams.

  – SAP to AFP Transform

    This transform converts (1) SAP R/3 Release 4.6C (and lower releases) Output Text Format (OTF) data streams to MO:DCA-P data streams and (2) SAP R/3 Release 4.6C (and lower releases) Advanced Business Application Programming (ABAP) data streams to line data streams. IBM AFP printers controlled by PSF can print both MO:DCA-P and line data streams.

- **Kanji AFP Print**

  This feature can be used with the PDF to AFP and PostScript to AFP transforms. It lets you print Japanese data streams that use Heisei Kaku Gothic W5 and Heisei Mincho W3 fonts, as well as embedded fonts. These two Heisei fonts, which are provided with this feature, must be installed on the z/OS system. The transform can map some other commonly used Japanese fonts, including Ryumin-Light and Gothic BBB-Medium, to these two Heisei fonts.

- **AFP to PCL Transform**

  This transform converts MO:DCA-P and line data streams to PCL 5, 5e, or 5c (color) data streams.

- **AFP to PDF Transform**

  This transform converts MO:DCA-P and line data streams to PDF 1.2 (monochrome or color) data streams.

- **AFP to PostScript Transform**

  This transform converts MO:DCA-P and line data streams to PostScript Language Level 2 (monochrome or color) data streams.

- **Coax Printer Support**

  This feature converts line data streams to Data Stream Compatibility/Data Stream Extended (DSC/DSE) and SNA Character String (SCS) data streams and in conjunction with IP PrintWay transmits the data to VTAM-controlled printers defined as VTAM LU0, LU1, or LU3 printers.

The Transforms to AFP feature and the Kanji AFP Print feature are available at no additional charge to customers who have purchased Infoprint Server. The other features are separately priced features.

A z/OS UNIX command for each transform lets users transform data in a z/OS UNIX file or MVS data set without printing it. The z/OS UNIX transform command creates an output file, which you can print or transmit to another system for viewing or printing. A filter provided for each transform lets Print Interface transform data before writing it to the JES spool. The z/OS UNIX commands and filters are: **afp2pcl**, **afp2pdf**, **afp2ps**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp**.

For more information about each transform, including its limitations, see Chapter 2, “Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 23.

Transform Manager

The Transform Manager component of Infoprint Server controls the transform daemons provided with Infoprint Server Transforms. The Transform Manager starts and stops the transform daemons using configuration information specified by the administrator. For example, the administrator can limit the number of transform daemons that are active at a time.

Figure 6 shows how the Transform Manager and Infoprint Server Transforms fit into your system. An explanation of each step follows:

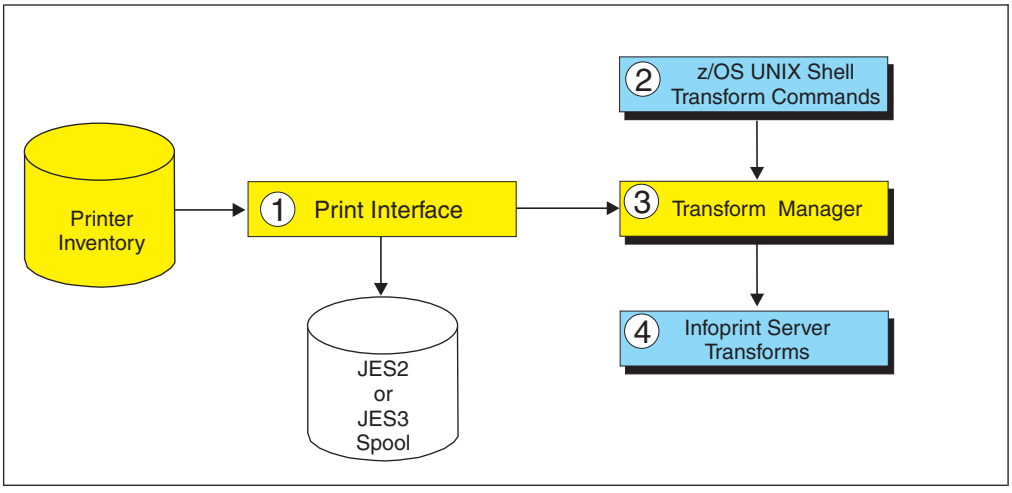

Figure 6. Transform Manager and Infoprint Server Transforms System Diagram

1. Print Interface uses transform filters provided by Infoprint Server Transforms to transform data on the z/OS system. The administrator must configure the printer definitions to use the transform filters because, by default, Print Interface does not transform data. The administrator and users can also specify transform options to control the transforms.

2. The z/OS UNIX transform commands provided with Infoprint Server Transforms let users transform data without printing it.
3. The Transform Manager manages the transform daemons and controls how many transform daemons are active at one time.

   Note: The Transform Manager does not manage the SAP to AFP transform and the Coax Printer Support feature, because they are not implemented as daemons.
4. Transforms provided with Infoprint Server Transforms perform the data transform.

NetSpool

The NetSpool component of Infoprint Server intercepts print data from VTAM applications, such as CICS and IMS, converts the data into line data, and creates output data sets on the JES2 or JES3 spool. You can configure NetSpool so that you do not need to change existing VTAM applications; that is, existing VTAM applications can send print requests to NetSpool in the same manner as they currently send print requests to SNA network printers.

Figure 7 shows the steps that occur from the time VTAM applications send print requests to NetSpool printer logical units (LUs) until NetSpool allocates output data sets on the JES spool. An explanation of each step follows.

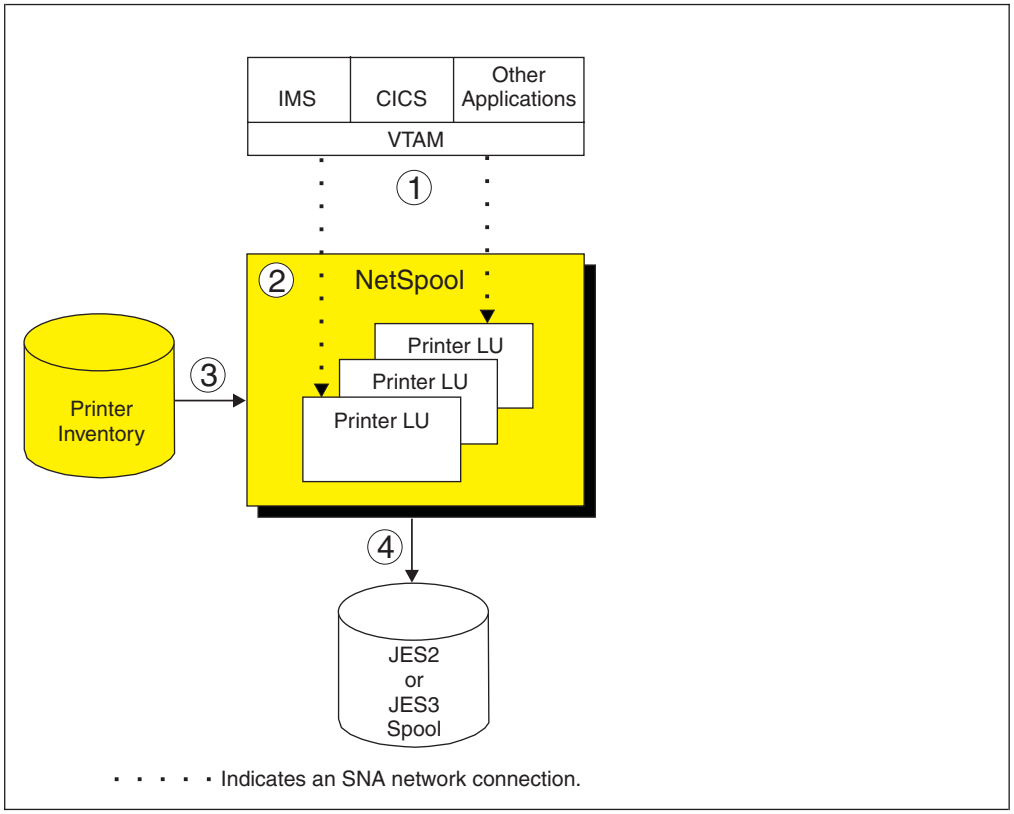

Figure 7. NetSpool System Diagram

1. VTAM applications, such as CICS or IMS, establish communication sessions with NetSpool printer logical units (LUs) instead of with SNA-network printers. Each NetSpool printer LU must be defined to VTAM as an application logical-unit (LU).

NetSpool can process the following types of VTAM data streams:
- SNA character string (SCS) data over an LU type 1 session
- 3270 data over an LU type 3 or LU type 0 session
- A binary data stream over an LU type 0, type 1, or type 3 session

2. NetSpool runs as a VTAM application on the same or different z/OS system. Multiple instances of NetSpool can run simultaneously in separate address spaces; each instance of NetSpool can process VTAM print requests sent to different NetSpool printer LUs.
3. Each NetSpool printer LU must be defined in a printer definition or in a printer pool definition in the Printer Inventory. NetSpool uses information in the printer definition to format data into lines and pages, create either a line data stream or a PCL data stream, and group the data into output data sets.
4. NetSpool dynamically allocates output data sets on the JES2 or JES3 spool using JES allocation parameters specified in the printer definition, including:
   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 uses these parameters when printing data on IBM AFP printers.
   - Distribution information, such as name and address, which can be printed on output header pages

Additional functions provided by NetSpool are:

- **Operator control**

  The system operator can control NetSpool processing from the system console and from extended MCS consoles by issuing NetSpool commands while NetSpool is running. The operator can start and stop individual printer LUs and display the status of printer LUs. To assist in managing data sets from the console, the names of the output data sets created by NetSpool identify the VTAM application that generated the print request.

- **SCS and 3270 data stream support**

  NetSpool can convert SCS and 3270 data streams into line data streams or PCL data streams. See Appendix C, “NetSpool Support for SCS Code Points” on page 193 and Appendix D, “NetSpool Support for 3270 Data Streams Code Points” on page 203 for information about how NetSpool supports SCS and 3270 data streams.

  NetSpool also supports the Transparent (TRN) control in SCS data. The TRN control identifies the start of a transparent data stream.

- **Broadcasting output**

  You can print output to several printers at the same time. Also, you can print output and send it to e-mail destinations at the same time. To do this, the administrator creates a printer pool definition in the Printer Inventory. When VTAM application data is printed to the printer pool definition, NetSpool creates multiple output data sets on the JES spool.

- **Installation exits**

  NetSpool supports exits written by an installation to customize NetSpool processing. NetSpool exits let you add data to the beginning of an output data set, map graphic escape characters to other printable characters, and modify or delete transparent data in an SCS data stream.

- **Binary data support**

  The administrator can request in the printer definition that NetSpool treat the data stream as binary data. NetSpool writes binary data to the output data set as variable length records without formatting the data and without rejecting unsupported commands, orders, or data. This function is useful if you want to pass through all data without change and without including transparent (TRN) controls.

IP PrintWay

The IP PrintWay component of Infoprint Server transmits output data sets from the JES spool to remote printers or print servers and to e-mail destinations, using one of the following transmission protocols:

- LPR: The LPR protocol is a TCP/IP protocol defined by RFC 1179. An LPD that adheres to RFC 1179 must be running in the remote printer or system.
- Direct-sockets printing: The direct sockets printing protocol is a TCP/IP protocol in which data is transmitted directly to a designated port. The remote printer or print server must support direct sockets printing.
- Internet Printing Protocol (IPP): IPP is a standard TCP/IP protocol for printing over the Internet. An IPP server must be running in the remote printer or system.
- Virtual Telecommunications Access Method (VTAM): IP PrintWay supports printing to any printer that is defined to VTAM as LU type 0, LU type 1, or LU type 3. Supported output data streams are SNA character string (SCS) and Data Stream Compatible/Data Stream Extended (DSC/DSE). The Coax Printer Support feature of Infoprint Server Transforms is required to print to VTAM-controlled printers.
- E-mail: IP PrintWay can use the z/OS UNIX sendmail function to send your print output to one or more e-mail addresses. IP PrintWay sends the output, which can be in any data format, as an e-mail attachment.

Note: IP PrintWay cannot transmit data sets larger than two gigabytes to a remote LPD. Also, depending on the IP PrintWay options the administrator selects in the printer definition, IP PrintWay might not be able to transmit data sets larger than two gigabytes to a remote printer that uses the IPP or direct-sockets printing protocol, or to e-mail destinations.

Figure 8 on page 17 shows the steps that occur from the time IP PrintWay selects output data sets from the JES spool until IP PrintWay transmits the data sets to the target destination and then deletes the data sets from the JES spool. An explanation of each step follows.

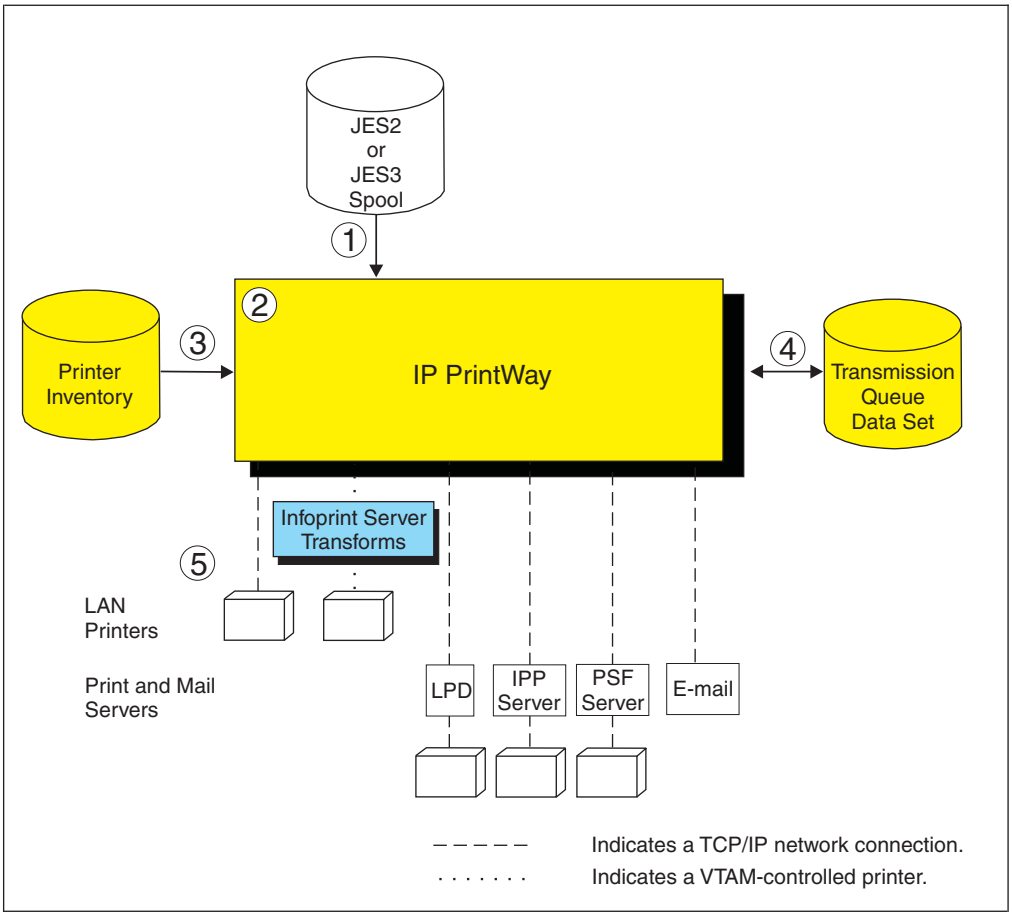

Figure 8. IP PrintWay System Diagram

1. IP PrintWay selects output data sets from the JES spool according to the JES work-selection parameters defined for the IP PrintWay FSA. For example, IP PrintWay might select all data sets in JES output class P.

   IP PrintWay can select data sets that were allocated on the JES spool by NetSpool or Print Interface, or submitted from TSO or batch applications. The data sets can contain line data, ASCII text data, or formatted data, such as PCL, PostScript, SAP, or MO:DCA-P (AFP) data.
2. IP PrintWay runs as a functional subsystem application (FSA) of JES2 or JES3. Several IP PrintWay FSAs can run in one functional subsystem address space (FSS) to handle a high volume of data; however, one PrintWay FSA can transmit data sets to multiple printers or print servers.
3. IP PrintWay uses information in the printer definition in the Printer Inventory to process data sets, select the transmission protocol (LPR, direct sockets, IPP, VTAM, or e-mail), and obtain the address of the target printer. IP PrintWay can also use the IP address of a target printer specified directly on an OUTPUT JCL statement or in an Infoprint Server job attribute.

   IP PrintWay recognizes data sets allocated on the JES spool by Print Interface and NetSpool and does not convert data from EBCDIC to ASCII or format the data if Print Interface or NetSpool has already converted data to ASCII. For other data sets, IP PrintWay can convert data between EBCDIC and ASCII, can add a header to each page, and can format data using the carriage-control characters in line data, an FCB, or pagination attributes specified in the printer definition.

IP PrintWay can use transforms provided by Infoprint Server Transforms to convert data from one format to another. IP PrintWay calls Print Interface, if necessary, to perform the data transform. Refer to *z/OS Infoprint Server Operation and Administration* for more information about how IP PrintWay calls Print Interface when the printer definition requests data transforms.

4. IP PrintWay maintains a transmission queue to keep track of data sets being processed. This transmission queue contains the status of each transmission, routing information, and so on. Using Infoprint Server ISPF panels, the system operator can monitor the status of transmissions, reroute data sets to another printer or e-mail destination, and change transmission options.
5. IP PrintWay transmits data sets to the target system using the protocol selected in the printer definition (LPR, direct sockets, IPP, VTAM, or e-mail). When IP PrintWay transmits data to a VTAM-controlled printer, IP PrintWay uses the Coax Printer Support feature of Infoprint Server Transforms.

   IP PrintWay can also transmit LPD options and IPP job attributes to the target LPDs and IPP servers. For example, IP PrintWay can transmit information that the LPD prints on a separator page.

   IP PrintWay can retry an unsuccessful transmission for a specified number of times at a specified interval. Retry limits and retry times can be specified in the printer definition and on an OUTPUT JCL statement. In addition to the requested retries, IP PrintWay retries an unsuccessful transmission automatically for a short period of time right after transmission.

Additional functions provided by IP PrintWay include:

- **Retaining jobs on the JES spool**

  After successfully transmitting each data set, or after completing the requested number of transmission attempts, IP PrintWay can retain the data set on the JES spool forever or for a period of time. Retention periods can be specified in the printer definition or on an OUTPUT JCL statement.
- **Printer selection using an OUTPUT JCL statement**

  On an OUTPUT JCL statement, a user can select the printer definition by specifying either (1) the name of the printer definition in the FSSDATA parameter or (2) the DEST, CLASS, or FORMS parameter (or a combination of these parameters) associated with the printer definition.

  Users can also specify the IP address for the target printer directly on the OUTPUT JCL statement, thereby eliminating the need for the administrator to create a printer definition for each printer in the Printer Inventory.
- **Accounting**

  For each data set processed, IP PrintWay writes a System Management Facility (SMF) type-6 record, which includes the number of bytes transmitted and the IP address of the target system.
- **Installation exits**

  IP PrintWay supports exits written by an installation to customize IP PrintWay processing. For example, an exit can change the IP address of the remote printer, add separator pages, modify SMF accounting records, and notify users of processing events.
- **Maintaining transmission order**

  IP PrintWay preserves the order of the data sets on the JES spool when transmitting data sets. IP PrintWay retains this order even if the transmission of the data sets must be retried. If a JES output group contains more than one output data set, IP PrintWay acquires all of the data sets in the output group before transmitting any of them and can transmit these data sets to the printer as

a single file. Although the data sets are a single file, each data set starts printing on a new page.

- **Transmitting printer commands**

  The administrator can specify printer commands in the printer definition for IP PrintWay to send to the printer before or after the data to be printed. Printer commands can be used to change fonts or switch between simplex and duplex printing.

SNMP Subagent

The Infoprint Server SNMP subagent, in conjunction with support provided by PSF for OS/390 and the z/OS SNMP agent, lets administrators monitor printer characteristics (such as the printer resolution) and printer status (such as paper jams) for any printer controlled by PSF for OS/390. Also, administrators can be notified as soon as an intervention situation (such as a paper jam) occurs on the printer. This support does not let administrators change any printer characteristics.

To monitor PSF printers, the z/OS SNMP agent must be configured and an SNMP manager, such as IBM Network Printer Manager (NPM) for the Web, must be installed.

You can monitor PSF printers that do not contain internal SNMP agents, such as the IBM 3900 printer, and also PSF printers that have internal SNMP agents but are not TCP/IP-attached to PSF. You can also monitor PSF TCP/IP-attached printers that contain internal SNMP agents; however, consider defining PSF printers that have internal SNMP agents directly to the SNMP manager. When you define a printer directly to the SNMP manager, you can also monitor printer statistics and change some printer characteristics. Refer to the documentation for your printers to determine if they have internal SNMP agents.

Figure 9 on page 20 shows how the SNMP subagent fits into your system. An explanation of each step follows:

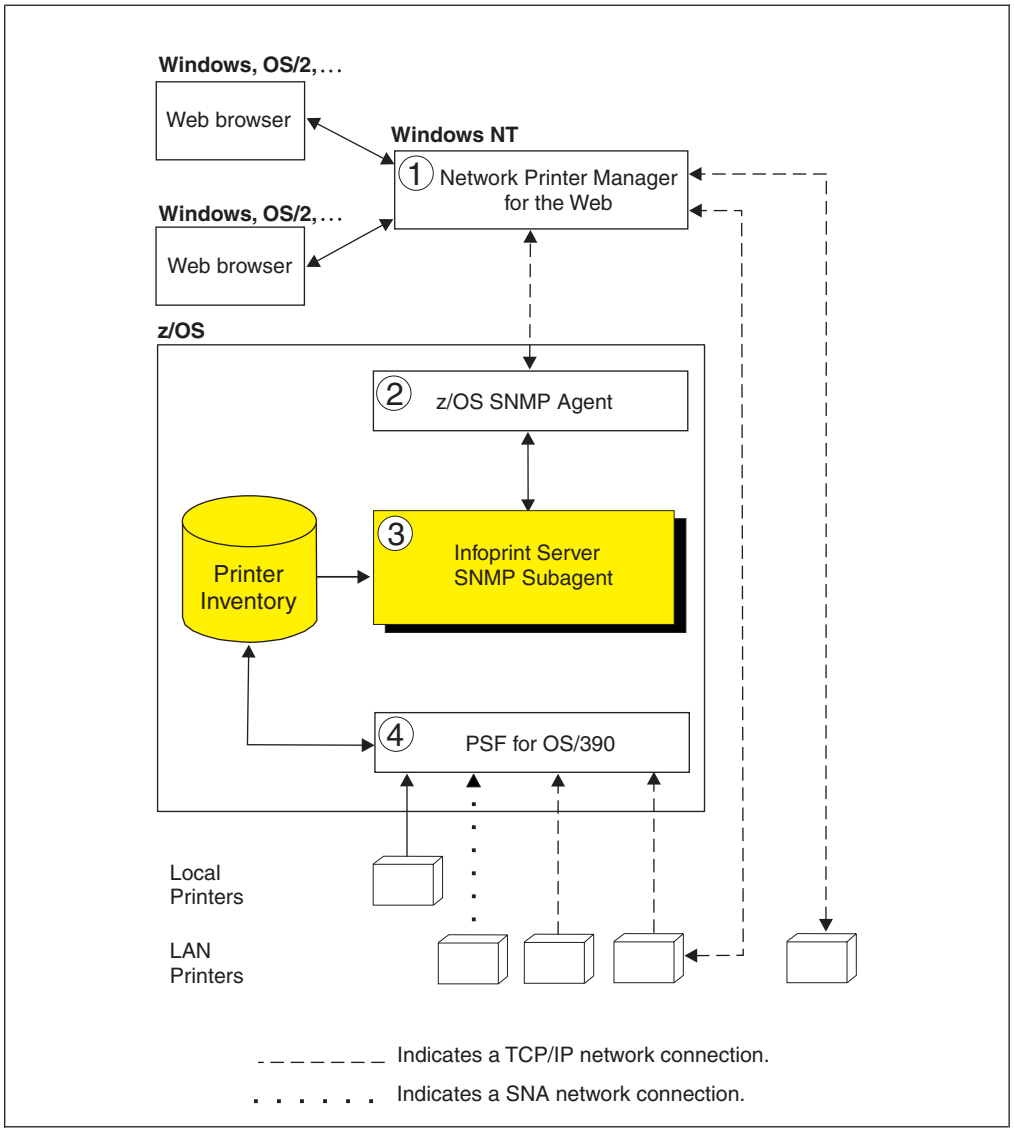

Figure 9. SNMP Subagent System Diagram

1. To monitor PSF printers, you must install an SNMP manager. You can install any SNMP manager that communicates with an SNMP agent that supports the general printer MIB (defined in RFC 1759) and has implemented support for multiple printers defined with one IP address.

   One SNMP manager that provides the required support is IBM Network Printer Manager (NPM) for the Web, which is shown in Figure 9. You can download NPM from the IBM Printing Systems Division Web site. Administrators can use a Java®-enabled version of Netscape Navigator or Microsoft® Internet Explorer to monitor PSF printers, while the NPM server runs on a Windows NT® system. Note that NPM limits the number of PSF printers an administrator can monitor at the same time; see the NPM online help for the maximum number of printers NPM lets you monitor.

   As shown in the figure, the SNMP manager (NPM) can also communicate directly with any TCP/IP-attached printer that contains an internal SNMP agent; this printer can be controlled by PSF, but this is not necessary.
2. The SNMP agent, part of the z/OS Communications Server, communicates with the SNMP manager and with the Infoprint Server SNMP subagent.

3. The Infoprint Server SNMP subagent communicates with PSF for OS/390 through the Printer Inventory. PSF for OS/390 stores printer characteristics and printer status in the Printer Inventory for any printer that has SNMP-reporting enabled. (The administrator enables SNMP reporting in the FSA definition for the PSF printer).

   The SNMP subagent transmits the information stored by PSF for OS/390 to the SNMP manager through the z/OS SNMP agent. The SNMP subagent also notifies the SNMP manager immediately when PSF for OS/390 detects a change to printer characteristics or printer status.
4. PSF for OS/390 obtains printer characteristics and printer status from any PSF-controlled printer. The PSF printer can be channel-attached, TCP/IP-attached, or SNA-attached; however, the PSF printer cannot be attached using the Download for OS/390 feature of PSF.

   If a PSF-controlled printer is shared with another printing application, and is not connected to PSF when an intervention required situation occurs, PSF cannot report the change in printer status.

Chapter 2. Printing from z/OS UNIX System Services Using Infoprint Server Commands

This chapter describes the z/OS UNIX printing commands provided by Infoprint Server and the z/OS UNIX transform commands provided by Infoprint Server Transforms.

Printing Commands: The following printing commands let you print, query, and cancel the printing of files. These commands also let you send files to an e-mail destination instead of to a printer.

- "cancel—Cancel a Print Job" on page 49
- "lp—Print a File" on page 51
- "lpstat—Show Printer Names and Locations and Status of Print Jobs" on page 60

Transform Commands: The following transform commands let you transform data from one data format to another without printing it:

- "afp2pcl—Transform AFP or Line Data to PCL Data" on page 28
- "afp2pdf—Transform AFP or Line Data to PDF Data" on page 35
- "afp2ps—Transform AFP or Line Data to PostScript Data" on page 42
- "pcl2afp—Transform PCL Data to AFP Data" on page 65
- "pdf2afp and ps2afp—Transform PDF or PostScript Data to AFP Data" on page 69
- "sap2afp—Transform SAP OTF or ABAP Data to AFP Data" on page 78

Using these printing commands, you can print UNIX files and MVS data sets on any printer that your administrator has defined in a printer definition in the Infoprint Server Printer Inventory. You can print on local printers that are attached directly to z/OS, or on remote printers in a TCP/IP or SNA network. Instead of printing, you can use the same printing commands to send the data to any e-mail destination that your administrator has defined in a printer definition.

These printing commands provide enhanced function over the commands of the same name that are described in *z/OS UNIX System Services Command Reference*. For example, when you print on IBM Advanced Function Presentation (AFP) printers, you can specify options such as duplexing or a special overlay. You can also display the status of your print request, and you can cancel a print request. The printing commands adhere to the UNIX standards in XPG4.2, so you do not need to change the printing commands in your UNIX applications when you port them to z/OS.

Online Help for Infoprint Server Commands

To get online help about Infoprint Server commands, use the **man** command. You can view man pages only in English. If the correct man pages are not displayed, specify the following path on the -M option of the **man** command, or add the following path to your MANPATH environment variable ahead of other values:

```
/usr/lpp/Printsrv/man/En_US
```

Messages Issued by Infoprint Server Commands

The Infoprint Server commands issue messages to your console. These commands can issue messages in English or Japanese. If the messages do not appear in the language you desire, add one of the following values to your **NLSPATH** environment variable. Add the value ahead of other values in the environment variable.

English **/usr/lpp/Printsrv/En_US/%N**

Japanese **/usr/lpp/Printsrv/Ja_JP/%N**

Transforming Jobs to AFP Format

While Infoprint Server allows you to submit data in many different formats, Advanced Function Presentation (AFP) printers print the AFP data stream. You can submit other data streams to AFP printers because an optional product, Infoprint Server Transforms (5697-F51), converts jobs to AFP format.

Note: Documents in AFP format are also called Mixed Object Document Content Architecture Presentation (MO:DCA-P) documents.

Usually, you do not have to worry about transforming your data to another format. If Infoprint Server Transforms is installed, Infoprint Server automatically calls the appropriate transform when you submit a print request to a printer definition (for a printer or for an e-mail destination) that your administrator has configured for transformation. You might, however, want to transform a file without printing it in these situations:

- You want to verify that the job can be transformed without errors.
- You intend to print a file many times. In this case, it is more efficient to transform the file once and print the output than to transform the file every time you print it.

Transforming Jobs from AFP Format

Three features of Infoprint Server Transforms convert jobs from AFP format into PCL, PDF, and PostScript. These features allow you to print files in AFP format on PCL and PostScript printers, and to transform an AFP file to PDF format for viewing on a workstation.

Note: Documents in AFP format are also called Mixed Object Document Content Presentation Architecture (MO:DCA-P) documents.

Usually, you do not have to worry about transforming your data. If Infoprint Server Transforms is installed, Infoprint Server automatically calls the appropriate transform when you submit a print request to a printer definition (for a printer or for an e-mail destination) that your administrator has configured for transformation. You might, however, want to transform a file without printing it in these situations:

- You want to verify that the file can be transformed without errors.
- You intend to print a file many times. In this case, it is more efficient to transform the file once and print the output than to transform the file every time you print it.
- You want to present your document on the Web.

How Do You...

This section is a guide to the rest of this chapter. It tells you what Infoprint Server command you need to use for a printing task and sends you to the right place to get more information.

Print a File?

To print one or more files, use the **lp** command. For example, to print three copies of `myfile1` and `myfile2` on `Printer2`, which is defined in the Infoprint Server Printer Inventory, enter:

```
lp -d Printer2 -n 3 myfile1 myfile2
```

For more information, see "lp—Print a File" on page 51.

Send a File to an E-mail Destination?

To send one or more files to an e-mail destination, instead of to a printer, use the **lp** command. Infoprint Server can first transform data in the files into a format that is suitable for viewing, for example, into PDF format.

For example, to send files `myfile1` and `myfile2` to e-mail destination `dept123`, which is defined in the Infoprint Server Printer Inventory, enter:

```
lp -d dept123 myfile1 myfile2
```

The recipients listed in the printer definition receive two separate e-mails.

For more information, see "lp—Print a File" on page 51.

Print or E-mail Files with Special Requirements?

You can use Infoprint Server *job attributes* to describe special requirements. Attributes specify things like these:

- Whether to print on one or both sides of the paper
- Resources like fonts, page definitions, form definitions, and overlays
- Text to print on the separator sheet or the subject of the e-mail

Use the **-o** option of the **lp** command to specify attribute values when you print a file or send a print file to an e-mail destination. For example, you want to print file `special.job` on both sides of the paper that is loaded in input tray `top` of `Printer2`. You want to print one overlay, `O1ODD`, on all the front sides of the paper and another, `O1EVEN`, on all the back sides. Both overlays reside in a library called `MYOVR.LIBRARY`. Enter:

```
lp -d Printer2 -o "input-tray=top duplex=yes
   overlay-front=O1ODD overlay-back=O1EVEN
   resource-library=MYOVR.LIBRARY" special.job
```

Instead of entering all the attributes on the command line, you can store them in an attributes file. If the attributes file is called `myatts`, enter:

```
lp -d Printer2 -o attributes=myatts special.job
```

For a list of job attributes and a description of the use and values of each one, see "Attribute Listing" on page 85. For information about attributes files, see "Attributes Files" on page 84. For information about the **-o** option of the **lp** command, see "lp—Print a File" on page 51.

How Do You...

Find Out Where the Printers Are?

Use the **lpstat** command to display printer definition names and locations. For example, to see the names and locations of all printers and e-mail destinations known to Infoprint Server, enter:

```
lpstat -a
```

For more information, see “lpstat—Show Printer Names and Locations and Status of Print Jobs” on page 60.

Find Out if a File Is Printing?

You can also use the **lpstat** command to display the status of an Infoprint Server job. For example, you submitted several files to print and want to know if any of them are printing. To display information about all your jobs submitted to any printer, enter:

```
lpstat
```

You can also use **lpstat** to display printer location and job status at the same time. For example, you printed a file to `Printer3` and want to pick it up if it has printed instead of waiting to have it delivered to your output bin. To find out where `Printer3` is and whether any job that you submitted to it has printed, enter:

```
lpstat -o Printer3
```

For more information, see “lpstat—Show Printer Names and Locations and Status of Print Jobs” on page 60.

Cancel an Infoprint Server Job?

Use the **cancel** command to cancel a job submitted to Infoprint Server. For example, you realize that you need to make some changes in the file that you just sent to print on `Printer3`.

If you don’t remember the Infoprint Server job ID that the **lp** command returned, use the **lpstat** command to display all the jobs that you submitted to `Printer3`:

```
lpstat -o Printer3
```

Suppose that your job has an ID of `17`. To cancel it, enter:

```
cancel 17
```

For more information, see “cancel—Cancel a Print Job” on page 49.

Transform a File to AFP Format?

Infoprint Server automatically transforms files in other formats to the Advanced Function Presentation (AFP) data stream when you submit them to a printer definition that the print administrator has configured to do so. You can also use the **pcl2afp**, **pdf2afp**, **ps2afp**, and **sap2afp** commands to transform files in the following formats without printing them:

- Printer Control Language (PCL)
- Portable Document Format (PDF)
- PostScript
- SAP Advanced Business Application Programming (ABAP)
- SAP Output Text Format (OTF)

For example, to transform the PostScript file `myfile.ps` to an AFP file called `myfile.afp`, with each page 5.5 inches long and 4 inches wide, enter:

```
ps2afp -o myfile.afp -l 5.5i -w 4i myfile.ps
```

To submit the PCL file `sample.pcl` to the printer named `Printer1` and transform it automatically, enter:

```
lp -d Printer1 sample.pcl
```

Note: This example assumes that your administrator has configured the `printer1` printer definition in the Infoprint Server Printer Inventory to use the PostScript to AFP or PCL to AFP transform.

For more information, see the following topics:

- “pcl2afp—Transform PCL Data to AFP Data” on page 65
- “pdf2afp and ps2afp—Transform PDF or PostScript Data to AFP Data” on page 69
- “sap2afp—Transform SAP OTF or ABAP Data to AFP Data” on page 78

Transform a File from AFP Format?

Your administrator can set up your printer definitions so that if you submit a file in AFP format to a printer or to an e-mail destination that does not support AFP but supports PCL, PDF, or PostScript, Infoprint Server can automatically transform the AFP file to the appropriate format. You can also use the **afp2pcl**, **afp2pdf**, and **afp2ps** commands to transform AFP files into the following formats without printing them:

- Printer Control Language (PCL)
- Portable Document Format (PDF)
- PostScript

For example, to transform the AFP file `myfile.afp` to a PostScript file called `myfile.ps`, printed in duplex, enter:

```
afp2ps -j "duplex=yes" -o myfile.ps myfile.afp
```

To submit the AFP file `sample.afp` to the printer named `Printer1`, where Printer1 is a non-AFP printer, and transform it automatically, enter:

```
lp -d Printer1 sample.afp
```

Note: This example assumes that your administrator has configured the `printer1` printer definition in the Infoprint Server Printer Inventory to use the AFP to PostScript or AFP to PCL transform.

For more information, see the following topics:

- “afp2pcl—Transform AFP or Line Data to PCL Data” on page 28
- “afp2pdf—Transform AFP or Line Data to PDF Data” on page 35
- “afp2ps—Transform AFP or Line Data to PostScript Data” on page 42

afp2pcl—Transform AFP or Line Data to PCL Data

Format

afp2pcl [**-c** *transformclass*] [**-F** *tracefile*] [**-i** *inputcodepage*] [**-j** *jobattributes*]...

[**-o** *outputfile*] [**-T** *traceoptions*] [*inputfile ...*]

Description

The **afp2pcl** command converts an Advanced Function Presentation (AFP) or line data stream file into a Printer Control Language (PCL) 5, 5e, or 5c (color) data stream file. This command is part of the Infoprint Server Transforms product.

Options

Note: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the AFP to AFP transform.

-c *transformclass*

Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*

Specifies the file in which to store the trace. This should only be used as instructed by IBM service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

-i *inputcodepage*

This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. If this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the **chars** job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file.

In the **-i** option, you must specify a code page provided by IBM and supported by the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify `-i IBM-500`:

Coded Font	PSF Code Page ID	IBM Code Page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

Note: When you specify this option, also ensure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

Specifies an option, that is, one or more attribute value assignments in the format *attribute*=*value*, separated by spaces. You can specify **-j** multiple times. If job attributes are repeated, the last value specified for the attribute is used.

- If a value contains spaces, enclose the value in single or double quotation marks:

  ```
  attribute='value with spaces'
  attribute="value with spaces"
  ```

- If an option contains spaces or characters that might be interpreted by the shell, such as **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **"**, and so on, enclose the option in single or double quotation marks:

  ```
  -j 'attribute1=value1 attribute2=value2'
  -j "attribute='value with spaces'"
  -j "attribute=value(1)"
  ```

  For information about how the shell interprets special characters, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

    ```
    -j "attribute=\"value with spaces\""
    ```

  - Use different quotation marks around the option and value, for example:

    ```
    -j 'attribute="value with spaces"'
    -j "attribute='value with spaces'"
    ```

Instead of entering a string of attributes on the command line, you can store attributes and values in a file. You use a special attribute called **attributes** to specify the file.

You can specify any of the following attributes, which apply to all files to be transformed with the command:

carriage-control-type	chars	document-codepage
document-format	duplex	form-definition
input-tray-number	output-bin-number	overlay-back
overlay-front	page-definition	resource-library
shift-out-shift-in	table-reference-characters	x-image-shift-back
x-image-shift-front	y-image-shift-back	y-image-shift-front

See “Attribute Listing” on page 85 for more information about the attributes.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PCL data) is written. The transform overwrites any existing data in the output file. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. Allocate a data set that is large enough to hold the output data stream; the size of the output data stream depends on the complexity of the document. Allocate the output data set with the following characteristics:

- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2pcl** command concatenates the files. The results are written to a single output file (if one is specified in **-o**) or to standard output.

If you do not specify an input file, or if you specify a dash (**-**) for the file name, **afp2pcl** uses standard input.

To specify an MVS data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks: for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

Usage Notes

- Some properties of the output, such as page size, input tray numbers, and color output, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2pcl** uses the last value that you specified.

- All AFP resources are transformed into PCL and are included in the output data stream to guarantee resource availability.
- IBM recommends that you print transform output on printers that support PCL 5, 5e or 5c. A printer that supports PCL 5c is required to print color output.
- The document formatting options in your document, such as paper size and duplexing, are converted to PCL commands. However, the interpretation of these commands might vary slightly from printer to printer. Unpredictable results can occur if you request formatting options that are not installed in your printer.
- When transforming line data in UNIX files that contain ANSI or no carriage control characters, **document-format=line** must be specified. If the data has ANSI control characters, also specify **carriage-control-type=ansi**.
- To create output that prints edge-to-edge on capable printers, your administrator must specify a paper name designed for edge-to-edge printing in the transform configuration file.

  To use the edge-to-edge paper on a capable printer, ask your administrator which printer definition and input tray to specify.

  Some printers do not support edge-to-edge printing. On such printers, documents created for edge-to-edge printing have the outside 50 pels, approximately 4 millimeters, of output cut off.
- Any library that the transform needs to access must be defined to RACF® with universal read access.

Supported MO:DCA-P Objects, AFP Resources, and Line Data Controls

The AFP to PCL transform supports the following:

MO:DCA-P obects:

- BCOCA: Bar codes
- FOCA:
  - SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are mapped to equivalent raster fonts.
  - DBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are not supported.
- GOCA: All functions
- IM: All functions, in single and double dot, in all rotations
- IOCA:
  - Uncompressed, compressed MMR, G3, G4, RL4, ABIC(non-concatenated), JPEG baseline and extended
  - IDE 1-8, 24 (lookup table)
- Object containers for JPEG, JIFF and TIFF image objects
- PTOCA1, PTOCA2

AFP resources

- Page definitions
- Form definitions, including conditional processing and basic N_UP processing.
- Overlays
- Page segments
- User resource libraries

Line data controls

- Carriage control (ANSI, machine)
- Table reference characters
- Shift out/shift in DBCS data - SOS1 and SOSI2 and SOSI3 options
- Mixed line data and AFP records (including IDM, IMM)

Limitations

This section lists the items in the AFP architecture that the AFP to PCL transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. We suggest that you test how your AFP applications print on non-AFP printers to make sure that the transform supports all of the AFP functions that your applications use.

- Internal copy groups.
- IOCA Color Plus image objects (IOCA FS45).
- Outline fonts. If outline fonts are included in your input data streams, the transform can map them to the equivalent AFP raster fonts. Font mapping in the transform uses a mapping table designed for the single-byte fonts in IBM AFP Font Collection (Program Number 5648–B33). Scaling of outline fonts is also not supported; therefore, the page definition must specify a RATIO of 100 or omit the RATIO keyword. Refer to *z/OS Infoprint Server Customization* for information about font mapping.
- Output is generated using a resolution of 300 pels. If the input includes resources (for example, fonts) which are not 300 pels, then the resulting output will be degraded.

Examples

Transform an AFP File, Specifying a Transform Class and Output File

To transform the AFP file `myfile.afp` into a PCL file, using the `us` transform class, and write a file called `myfile.pcl`, enter:

```
afp2pcl -c us -o myfile.pcl myfile.afp
```

Transform an AFP Data Set, Specifying a Form Definition

To transform the MVS™ data set `AFP(MYFILE)` into a PCL file, using the form definition `F1CP0110`, and write a file called `myfile.pcl`, enter the following command:

```
afp2pcl -j "form-def=f1cp0110 " -o myfile.pcl "//'AFP(MYFILE)'"
```

Transform an AFP File, Specifying a Form Definition and a Resource Library

To transform the AFP file `myfile.afp` into a PCL file, using the form definition `F1CP0110` that contains references to user supplied AFP resources, and write a file called `myfile.pcl`, enter the following command on one line:

```
afp2pcl -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
        -o myfile.pcl myfile.afp
```

Transform and Print an AFP Data Set, Specifying a Form Definition and a Resource Library

To transform the AFP data set `PROD.AFPOUT(JOB1)` into a PCL file, using the form definition `f1cp0110` that contains references to user supplied AFP resources, and print the output, enter the following command on one line:

```
afp2pcl -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
"//'PROD.AFPOUT(JOB1)'" | lp
```

Transform a Job Using Redirection

To transform the AFP file `input.afp` into the PCL output file called `output.pcl` enter:

```
afp2pcl < input.afp > output.pcl
```

Note: You can use redirection operators only with UNIX files.

Transform Multiple Files and Concatenate the Output

To transform the AFP files `input.01.afp`, `input.02.afp`, ... `input.xx.afp` into one PCL output file called `output.pcl` enter:

```
afp2pcl -o output.pcl input.01.afp input.02.afp ... input.xx.afp
```

Transform a UNIX File to an MVS Data Set

To transform the line data file `input.line` into an MVS PCL output data set called *hlq*.OUTPUT.PCL(MYDOC) enter:

```
afp2pcl -j doc-format=line -o "//'hlq.OUTPUT.PCL(MYDOC)'" input.line
```

Transform an MVS Data Set, Writing the Output to a UNIXFile

To transform the MVS data set HLQ.INPUT.LINE(MYDOC) into an output file called `output.pcl`, enter:

```
afp2pcl -o output.pcl "//'hlq.INPUT.LINE(MYDOC)'"
```

Transform Line Data, Specifying a Form Definition and a Page Definition

To transform line data in file `myfile.line` that contains ANSI carriage control characters into PCL format, using the form definition `F1CP0110` and page definition `P1P06362`, and write a file called `myfile.pcl`, enter the following command on one line:

```
afp2pcl -j "form-def=f1cp0110 page-def=p1p06362 c-c-t=a doc-format=line"
-o myfile.pcl myfile.line
```

Transform a File Containing Line Data, Specifying a Form Definition and Fonts

To transform the line data file `myfile.line` containing machine carriage control characters and table reference characters into a PCL file, using the form definition `F1CP0110`, and write a file called `myfile.pcl`, enter the following command on one line:

```
afp2pcl -j "form-def=f1cp0110 c-c-t=m t-r-c=yes chars={60D8 60d0}"
-o myfile.pcl myfile.line
```

Environment Variables

The **afp2pcl** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **afp2pcl** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration file.

Exit Values

0 The data were transformed successfully.

>0 An error occurred.

afp2pdf—Transform AFP or Line Data to PDF Data

Format

afp2pdf [**-c** *transformclass*] [**-F** *tracefile*] [**-i** *inputcodepage*] [**-j** *jobattributes*]...

[**-o** *outputfile*] [**-T** *traceoptions*] [*inputfile*]

Description

The **afp2pdf** command converts an Advanced Function Presentation (AFP) or line data file into an Adobe Portable Document Format (PDF) 1.2 data stream file. This command is part of the Infoprint Server Transforms product.

Options

Note: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the AFP to PDF transform.

-c *transformclass*

Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*

Specifies the file in which to store the trace. This should only be used as instructed by IBM service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

-i *inputcodepage*

This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. When this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the chars job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file.

In the **-i** option, you must specify a code page provided by IBM and supported by the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify: `-i IBM-500`

Coded Font	PSF Code Page ID	IBM Code Page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

Note: When you specify this option, also ensure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

Specifies an option, that is, one or more attribute value assignments in the format *attribute*=*value*, separated by spaces. You can specify **-j** multiple times. If job attributes are repeated, the last value specified for the attribute is used.

- If a value contains spaces, enclose the value in single or double quotation marks:

  ```
  attribute='value with spaces'
  attribute="value with spaces"
  ```

- If an option contains spaces or characters that might be interpreted by the shell, such as **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **"**, and so on, enclose the option in single or double quotation marks:

  ```
  -j 'attribute1=value1 attribute2=value2'
  -j "attribute='value with spaces'"
  -j "attribute=value(1)"
  ```

  For information about how the shell interprets special characters, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

    ```
    -j "attribute=\"value with spaces\""
    ```

  - Use different quotation marks around the option and value, for example:

    ```
    -j 'attribute="value with spaces"'
    -j "attribute='value with spaces'"
    ```

Instead of entering a string of attributes on the command line, you can store attributes and values in a file. You use a special attribute called **attributes** to specify the file.

You can specify any of the following attributes, which apply to all files to be transformed with the command:

carriage-control-type	chars	document-codepage
document-format	duplex	form-definition
input-tray-number	overlay-back	overlay-front
page-definition	resource-library	shift-out-shift-in
table-reference-characters	x-image-shift-back	x-image-shift-front
y-image-shift-back	y-image-shift-front	

See “Attribute Listing” on page 85 for more information about the attributes.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PDF data) is written. The transform overwrites any existing data in the output file. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. Allocate a data set that is large enough to hold the output data stream; the size of the output data stream depends on the complexity of the document. Allocate the output data set with the following characteristics:

- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2pdf** command will fail.

If you do not specify an input file, or if you specify a dash (**-**) for the file name, **afp2pdf** uses standard input.

To specify an MVS data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.pds(MYDOC)'"` or `"//'hlq.seqds'"`. When you specify a partially qualified name, you only need one set of quotation marks: for example, `"//pds(MYDOC)"` or `"//seqds"`.

Usage Notes

- Some properties of the output, such as page size and color, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2pdf** uses the last value that you specified.
- If your original document or formatting options (for example, form definition or job attributes) requires use of specific media options or printer features, such as generation of multiple copies, duplex, input and output bins, finishing, and

jogging, this information is not contained within the PDF document output. However, options such as duplex printing and input bin do interact with other variables to affect the PDF output. Any formatting that affects the placement of the image on the page is still valid with the AFP to PDF transform. When printing PDF documents, you can use the printer driver options to select printer features.

- By default, all AFP resources are transformed into PDF and are included in the output data stream. This guarantees resource availability.

  Your administrator can override this by specifying BUILTIN on the AOP_OUTLINES configuration option. When this is specified, font resources are not transformed and included in the data stream. Adobe Acrobat Reader will try to resolve the font references. It is possible that Acrobat will not be able to resolve some characters. However, in many applications BUILTIN will be a preferable mode of creating PDF files, because it can signifcantly reduce the size of the output PDF file.
- When transforming line data in a UNIX file that contains ANSI or no carriage control characters, **document-format=line** must be specified. If the data has ANSI control characters, also specify **carriage-control-type=ansi**.
- The IBM Document Composition Facility (DCF) program, by default, produces AFP documents that contain BookMaster fonts. Because BookMaster fonts do not have equivalent outline fonts, the transform cannot map them to outline fonts. To improve the readability of the documents with Adobe Acrobat, IBM recommends that you use the following two DCF options when you create AFP documents:
  - @COREFNT(YES)
  - @BOOKFNT(3)

  These options tell DCF to create AFP documents that use raster fonts in the AFP Font Collection instead of BookMaster fonts. All raster fonts in the AFP Font Collection have outline equivalents.
- Any library that the transform needs to access must be defined to RACF with universal read access.
- You can use Adobe Acrobat Reader 3.0 or later to view and print the PDF output. The following considerations apply when you view and print the PDF output:
  - The printed output might be smaller or larger than expected, for example, the output might be 90% of the original size, if the Fit To Page option is selected in the the Acrobat Reader Print Dialog box. To solve this problem, deselect the Fit To Page option. The Fit To Page option is selected by default in Acrobat Reader 4.0.
  - Transformed PDF images might look different from the original AFP image, depending on your monitor and printer.
  - If landscape output has been requested, the PDF document is in landscape format. If you later need portrait output, the PDF output can be rotated using Adobe Acrobat Reader.
  - The PDF transform uses the AFP font encoding to create the PDF document. The characters contained in the document might not be the same as the ASCII character mapping available on the keyboard used for PDF viewing.
  - The actual appearance of raster fonts using Adobe Acrobat Viewer or Acrobat plug-in can differ from the printed output. For example, in the Acrobat Reader some characters might not appear to be aligned on the character baseline. The appearance might change as higher magnification levels are chosen in Acrobat Reader.

    The default setting of the Acrobat Reader is to show all fonts under 6 pixels as Greek, or shaded gray lines. Therefore, some of the AFP output might not

be visible in the viewer. In order to correct this problem, in the Reader click **File** and select **Preferences**. On the **General** page, ensure that **Use Greek text below xx pixels** is not selected.

– PDF output contains a unique page number identification that is assigned during the creation of the PDF output file. This page number might not correspond to the page numbers used in the AFP input document.

Supported MO:DCA-P Objects, AFP Resources, and Line Data Controls

The following lists describe what the AFP to PDF transform supports.

MO:DCA-P obects:

- BCOCA: Bar codes
- FOCA:
  – SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are supported.
  – DBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are not supported.
- GOCA: All functions
- IM: All functions, in single and double dot, in all rotations
- IOCA:
  – Uncompressed, compressed MMR, G3, G4, RL4, ABIC(non-concatenated), JPEG baseline and extended
  – IDE 1-8, 24 (lookup table)
- Object containers for JPEG, JIFF and TIFF image objects
- PTOCA1, PTOCA2

AFP resources

- Page definitions
- Form definitions, including conditional processing and basic N_UP processing.
- Overlays
- Page segments
- User resource libraries

Line data controls

- Carriage control (ANSI, machine)
- Table reference characters
- Shift out/shift in DBCS data - SOS1 and SOSI2 and SOSI3 options
- Mixed line data and AFP records (including IDM, IMM)

Limitations

This section lists the items in the AFP architecture that the AFP to PDF transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. We suggest that you test how your AFP applications print on non-AFP printers to make sure that the transform supports all of the AFP functions that your applications use.

- DBCS outline fonts.
- Internal copy groups.
- IOCA Color Plus image objects (IOCA FS45).

- The AFP to PDF transform formats all output for the size of the paper in the first input tray selected.
- Limitations of searching with Adobe Acrobat Reader:
  - Text that has been generated using AFP GOCA output graphic characters cannot be found.
  - In order to preserve the output fidelity of a document, corresponding placement of characters is performed in the PDF output document, which can result in additional ″space″ characters within a character string. This restricts the operation of the Adobe find function.
  - The AFP representation of a code page might not match its ASCII representation. This can cause problems searching, especially with raster fonts.

Examples

Transform an AFP Job, Specifying a Transform Class and Output File

To transform the AFP file `myfile.afp` into a PDF file, using the `us` transform class, and write a file called `myfile.pdf`, enter:

```
afp2pdf -c us -o myfile.pdf myfile.afp
```

Transform an MVS AFP Job, Specifying a Form Definition

To transform the MVS AFP data set `AFP(MYFILE)` into a PDF file, using the form definition `F1C10110`, and write a file called `myfile.pdf`, enter the following command:

```
afp2pdf -j "form-def=f1c10110" -o myfile.pdf "//'AFP(MYFILE)'"
```

Transform an AFP Job, Specifying a Form Definition and a Resource Library

To transform the AFP file `myfile.afp` into a PDF file, using the form definition `F1C10110` that contains references to user supplied AFP resources, and write a file called `myfile.pdf`, enter the following command on one line:

```
afp2pdf -j "form-def=f1c10110 res-lib={lib1.pseglib lib3.private}"
        -o myfile.pdf myfile.afp
```

Transform a Job Using Redirection

To transform the AFP file `input.afp` into the PDF output file called `output.pdf` enter:

```
afp2pdf < input.afp > output.pdf
```

Note: You can use redirection operators only with UNIX files.

Transform a UNIX File to an MVS Data Set

To transform the line data file `input.line` into an MVS PDF output data set called `HLQ.OUTPUT.PDF(MYDOC)`, enter:

```
afp2pdf -j doc-format=line -o "//'HLQ.OUTPUT.PDF(MYDOC)'" input.line
```

Transform an MVS Data Set, Writing the Output to a UNIX File

To transform the MVS data set *hlq*`.INPUT.LINE(MYDOC)` into an output file called `output.pdf`, enter:

```
afp2pdf -o output.pdf "//'HLQ.INPUT.LINE(MYDOC)'"
```

Transform a File Containing Line Data, Specifying a Form Definition and a Page Definition

To transform the line data file `myfile.line` containing ANSI carriage control characters into a PDF file, using the form definition `F1C10110` and page definition `P1P06362`, and write a file called `myfile.pdf`, enter the following command on one line:

```
afp2pdf -j "form-def=f1c10110 page-def=p1p06362 c-c-t=a doc-format=line"
-o myfile.pdf myfile.line
```

Transform a File Containing Line Data, Specifying a Form Definition, a Page Definition, and Fonts

To transform the line data file `myfile.line` containing machine carriage control characters and table reference characters into a PDF file, using the form definition `F1C10110` and page definition `F1P06362`, and write a file called `myfile.pdf`, enter the following command on one line:

```
afp2pdf -j "form-def=f1c10110 page-def=p1p06362 c-c-t=m t-r-c=yes chars={60D8 60D0}"
-o myfile.pdf myfile.line
```

Transform a File Containing Line Data, Specifying a Page Definition and Print Offset

To transform the line data file `myfile.line` containing machine carriage control characters into a PDF file, using the page definition `P1P06362`, positioning the output 24 millimeters (approximately one inch) from the left edge of the paper, and write a file called `myfile.pdf`, enter the following command on one line:

```
afp2pdf -j "page-def=p1p06362 c-c-t=m x-image-shift-front=24" -o myfile.pdf
myfile.line
```

Environment Variables

The **afp2pdf** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **afp2pdf** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

Exit Values

0 The data were transformed successfully.

>0 An error occurred.

afp2ps—Transform AFP or Line Data to PostScript Data

Format

afp2ps [**-c** *transformclass*] [**-F** *tracefile*] [**-i** *inputcodepage*] [**-j** *jobattributes*]...

[**-o** *outputfile*] [**-T** *traceoptions*] [*inputfile ...*]

Description

The **afp2ps** command converts an Advanced Function Presentation (AFP) or line data file into a PostScript level 2 data stream file. This command is part of the Infoprint Server Transforms product.

Options

Note: You can use the **filter-options** job attribute with, for example, the **lp** command to pass the **-c** *transformclass* and **-i** *inputcodepage* options to the AFP to PostScript transform.

-c *transformclass*

Specifies the name of a transform class that your administrator has defined. The transform class determines options such as:

- The characteristics of the output printer device, such as whether it supports color
- The size of paper in each input tray
- Defaults for page formatting options, such as the default page definition, form definition, and font
- Resource libraries

You do not always have to specify a transform class. If you do need to specify one, however, ask your administrator for the name of a transform class suitable for the printer and the type of job.

-F *tracefile*

Specifies the file in which to store the trace. This should only be used as instructed by IBM service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

-i *inputcodepage*

This option applies only when you transform line data. If you specify this option for AFP data, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts specified in the page definition or in the **chars** job attribute.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. When this option is not specified, line data is not converted before it is transformed. For example, to transform a line data document that specifies coded fonts in the chars job attribute and currently prints correctly on an AFP printer, do *not* specify this option.

You must specify this option to correctly transform documents encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when you transform an ASCII file. In the **-i** option, you must specify a code page provided by IBM and supported by

the iconv utility; refer to *z/OS C/C++ Programming Guide* for valid code page names. To find the PSF code page ID for each character set, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The PSF code page ID and the names of the code pages provided by IBM are different. Be careful to specify the IBM code page value. For example, if you specify one of the following coded fonts in the **chars** job attribute, specify `-i IBM-500`:

Coded Fonts	PSF Code Page ID	IBM Code Page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

Note: When you specify this option, also ensure that the code page specified in the **document-codepage** job attribute correctly identifies the code page in which the input document is encoded. If you do not specify the **document-codepage** attribute, the default is the code page of the locale, which is usually an EBCDIC code page.

-j *jobattributes*

Specifies an option, that is, one or more attribute value assignments in the format *attribute*=*value*, separated by spaces. You can specify **-j** multiple times. If job attributes are repeated, the last value specified for the attribute is used.

- If a value contains spaces, enclose the value in single or double quotation marks:

  ```
  attribute='value with spaces'
  attribute="value with spaces"
  ```

- If an option contains spaces or characters that might be interpreted by the shell, such as **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **"**, and so on, enclose the option in single or double quotation marks:

  ```
  -j 'attribute1=value1 attribute2=value2'
  -j "attribute='value with spaces'"
  -j "attribute=value(1)"
  ```

  For information about how the shell interprets special characters, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

    ```
    -j "attribute=\"value with spaces\""
    ```

  - Use different quotation marks around the option and value, for example:

    ```
    -j 'attribute="value with spaces"'
    -j "attribute='value with spaces'"
    ```

Instead of entering a string of attributes on the command line, you can store attributes and values in a file. You use a special attribute called **attributes** to specify the file.

You can specify any of the following attributes to describe the job and all the files in it:

carriage-control-type chars document-codepage

document-format	duplex	form-definition
input-tray-number	output-bin-number	overlay-back
overlay-front	page-definition	resource-library
shift-out-shift-in	table-reference-characters	x-image-shift-back
x-image-shift-front	y-image-shift-back	y-image-shift-front

See “Attribute Listing” on page 85 for more information about the attributes.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, PostScript data) is written. The transform overwrites any existing data in the output file. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, you might need to allocate the data set before you run this command, especially when you transform a large document. Allocate a data set that is large enough to hold the output data stream; the size of the output data stream depends on the complexity of the document. Allocate the output data set with the following characteristics:

- Record format: VB
- Record length: 1024 or larger is recommended

-T *traceoptions*

Specifies the trace options. This should only be used as instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the **afp2ps** command concatenates the files. The results are written to a single output file (if one is specified in **-o**) or to standard output.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **afp2ps** uses standard input.

To specify an MVS data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required: for example, `"//'hlq.pds(MYDOC)'"` or `"//'hlq.seqds'"`. When you specify a partially qualified name, you only need one set of quotation marks: for example, `"//pds(MYDOC)"` or `"//seqds"`.

Usage Notes

- Some properties of the output, such as page size, input tray IDs, and color, are defined in the configuration file **aopxfd.conf**. Your administrator sets up this file.
- If you specify multiple values of the same option, except for **-j**, **afp2ps** uses the last value that you specified.
- The AFP transform for PostScript converts the document formatting options to corresponding PostScript commands (e.g. paper size, input tray, duplexing). The interpretation of these commands is dependent on your printer.

- All AFP resources are transformed into PostScript and are included in the output data stream. This guarantees resource availability.
- When transforming line data in UNIX files with ANSI or no carriage control characters, **document-format=line** must be specified. If the data has ANSI control characters, you must also specify **carriage-control-type=ansi**.
- To create output that prints edge-to-edge on capable printers, your administrator must specify a paper name designed for edge-to-edge printing in the transform configuration file.

  To use the edge-to-edge paper on a capable printer, ask your administrator which printer definition and input tray to specify.

  Some printers do not support edge-to-edge printing. On such printers, documents created for edge-to-edge printing have the outside 50 pels, approximately 4 millimeters, of output cut off.
- Any library that the transform needs to access must be defined to RACF with universal read access.

Supported MO:DCA-P Objects, AFP Resources, and Line Data Controls

The following lists describe what the AFP to PostScript transform supports.

MO:DCA-P obects:

- BCOCA: Bar codes
- FOCA:
  - SBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are supported.
  - DBCS: 300-pel raster fonts, fixed and relative metrics. AFP outline fonts are not supported.
- GOCA: All functions
- IM: All functions, in single and double dot, in all rotations
- IOCA:
  - Uncompressed, compressed MMR, G3, G4, RL4, ABIC(non-concatenated), JPEG baseline and extended
  - IDE 1-8, 24 (lookup table)
- Object containers for JPEG, JIFF and TIFF image objects
- PTOCA1, PTOCA2

AFP resources

- Page definitions
- Form definitions, including conditional processing and basic N_UP processing.
- Overlays
- Page segments
- User resource libraries

Line data controls

- Carriage control (ANSI, machine)
- Table reference characters
- Shift out/shift in DBCS data - SOS1 and SOSI2 and SOSI3 options
- Mixed line data and AFP records (including IDM, IMM)

Limitations

This section lists the items in the AFP architecture that the transform does not currently support. Because the AFP architecture and PSF continue to be enhanced with new functional capabilities, this list might be incomplete after the publication date. We suggest that you test how your AFP applications print on non-AFP printers to make sure that the transform supports all of the AFP functions that your applications use.

- Internal copy groups
- IOCA Color Plus image objects (IOCA FS45)

Examples

Transform an AFP Job, Specifying a Transform Class and Output File

To transform the AFP file `myfile.afp` into a PostScript file, using the `us` transform class, and write a file called `myfile.ps`, enter:

```
afp2ps -c us -o myfile.ps myfile.afp
```

Transform a File, Specifying a Form Definition

To transform the AFP file `AFP(MYFILE)` into a PostScript file, using the form definition `F1Cp0110`, and write a file called `myfile.ps`, enter the following command:

```
afp2ps -j "form-def=f1cp0110" -o myfile.ps "//'AFP(MYFILE)'"
```

Transform a File, Specifying a Form Definition and a Resource Library

To transform the AFP file `myfile.afp` into a PostScript file, using the form definition `F1CP0110` that contains references to user supplied AFP resources, and write a file called `myfile.ps`, enter the following command on one line:

```
afp2ps -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
       -o myfile.ps myfile.afp
```

Transform and Print an MVS Data Set, Specifying a Form Definition and a Resource Library

To transform the MVS data set `PROD.AFPOUT(JOB1)` into a PostScript file, using the form definition `F1CP0110` that contains references to user supplied AFP resources, and print the output, enter the following command on one line:

```
afp2ps -j "form-def=f1cp0110 res-lib={lib1.pseglib lib3.private}"
"//'PROD.AFPOUT(JOB1)'" | lp
```

Transform a Job Using Redirection

To transform the AFP file `input.afp` into the PostScript output file called `output.ps` enter:

```
afp2ps < input.afp > output.ps
```

Note: You can use redirection operators only with UNIX files.

Transform Multiple Files and Concatenate the Output

To transform the AFP files `input.01.afp`, `input.02.afp`, ... `input.xx.afp` into one PostScript output file called `output.ps` enter:

```
afp2ps -o output.ps input.01.afp input.02.afp ... input.xx.afp
```

Transform a UNIX File to an MVS Data Set

To transform the line data file `input.line` into an MVS PostScript output data set called *hlq*`.OUTPUT.PS(MYDOC)` enter:

```
afp2ps -j doc-format=line -o "//'hlq.OUTPUT.PS(MYDOC)'" input.line
```

Transform an MVS Data Set, Writing the Output to a UNIX File

To transform the MVS data set *hlq*.INPUT.LINE(MYDOC), where *hlq* is your user ID, into a PostScript output file called output.ps enter:

```
afp2ps -o output.ps "//'hlq.INPUT.LINE(MYDOC)'"
```

Transform a File Containing Line Data, Specifying a Form Definition and aPage Definition

To transform the line data file myfile.line containing ANSI carriage control characters into a PostScript file, using the form definition F1CP0110 and page definition P1P06362, and write a file called myfile.ps, enter the following command on one line:

```
afp2ps -j "form-def=f1cp0110 page-def=p1p06362 c-c-t=a doc-format=line"
-o myfile.ps myfile.line
```

Transform a File Containing Line Data, Specifying a Page Definition and Fonts

To transform the line data file myfile.line containing machine carriage control characters and table reference characters into a PostScript file, using the page definition P1P06362, and write a file called myfile.ps, enter the following command on one line:

```
afp2ps -j "page-def=p1p06362 c-c-t=m t-r-c=yes chars={60D8 60D0}" -o myfile.ps
myfile.line
```

Transform a File Containing Line Data, Specifying a Page Definition and Print Offset

To transform the line data file myfile.line containing machine carriage control characters into a PostScript file, using the page definition P1P06362, positioning the output approximately 1 inch from the left edge of the paper, and write a file called myfile.ps, enter the following command on one line:

```
afp2ps -j "page-def=p1p06362 c-c-t=m x-image-shift-front=24" -o myfile.ps
myfile.line
```

Environment Variables

The **afp2ps** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **afp2ps** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

Exit Values

0	The data were transformed successfully.
>0	An error occurred.

cancel—Cancel a Print Job

Format

cancel *jobid* ...

Description

The **cancel** command cancels one or more print jobs that you submitted, with these restrictions:

- You can only cancel your own jobs.
- You cannot cancel a job after it has started processing.
- In a JES3 environment, you may not be able to cancel a job that is held on the Job Entry Subsystem (JES) spool.

Operand

jobid **...**

The Infoprint Server job ID of the print job you want to cancel. If you do not know the Infoprint Server job ID, you can determine it by using the **lpstat** command to query all the jobs that you submitted.

The **lp** command and AOPPRINT JCL procedure return the Infoprint Server job ID to you when a job is accepted for printing. Infoprint Server also can return the Infoprint Server job ID to you when you submit a job from a remote system.

The Infoprint Server job ID is not the same as the z/OS job ID, which the z/OS system assigns to each job on the JES spool. When you submit a job using the Print Interface subsystem, the z/OS job ID is returned to you.

Examples

Cancel Jobs

To cancel jobs 3, 5, and 6, enter:

```
cancel 3 5 6
```

Identify a Job and Cancel It

You submitted a job to print and want to cancel it, but you don't remember the Infoprint Server job ID. Enter:

```
lpstat
```

lpstat returns information about all your jobs, including the Infoprint Server job ID and the names of the files in each job. You identify the job you want to cancel as job 27. To cancel it, enter:

```
cancel 27
```

Environment Variables

The **cancel** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **cancel** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Exit Values

0 Infoprint Server accepted the request.

>0 An error occurred that prevented Infoprint Server from accepting the request. Some possible errors are:

- The command syntax is not valid.
- Infoprint Server is not available.
- There was an error in reading the Infoprint Server configuration file.

Portability

There are no extensions to any Portable Operating System Interface for Computer Environments (POSIX) standard or to the XPG4.2 standard for the **cancel** command.

lp—Print a File

Format

lp [**-cmsw**] [**-d** *destination*] [**-n** *copies*] [**-o** *option*] ... [**-t** *title*] [*filename* ...]

Description

The **lp** command prints one or more files or sends the files to an e-mail destination. The address of the printer, or the e-mail address list, is specified in the printer definition in the Infoprint Server Printer Inventory, which your administrator manages.

The files can be:

- MVS data sets, such as partitioned data sets or sequential data sets
- UNIX files, such as files in a DFSMS Hierarchical File System (HFS), a Network File System (NFS), and a temporary file system (TFS)
- Lists of printable files

If you do not specify any files on the command line, or if you specify a dash (**–**) for the file name, **lp** prints from standard input.

If Infoprint Server Transforms is installed, Infoprint Server can automatically transform a file from one data format to another. To transform a file, the administrator must request the transform in the printer definition.

The **lp** command returns an Infoprint Server job ID, which you can use to query or cancel the job.

Options

-c Makes a copy of the file and prints that copy. Copying files allows you to change the original files after submitting the **lp** command. The printed file does not contain the changes. **-c** is the default.

-d *destination*
Selects the printer or the e-mail destination. For *destination*, specify the name of a printer definition in the Infoprint Server Printer Inventory. Contact your administrator for the names of printer definitions or use the **lpstat** command to list printer definition names.

You can omit this option if there is a default printer. You can define a default printer by setting the **LPDEST** or **PRINTER** environment variable. The administrator can also define a default printer. If you do not specify a printer and there is no default, the **lp** command issues an error message.

-m Notifies you by electronic mail when the file is removed from the system spool for any reason. Some reasons are:

- The file has finished printing.
- The file has been transmitted to a local area network (LAN) printer or to the z/OS UNIX sendmail function. You might receive notification before the file has finished printing or been sent to the e-mail destination. You might receive notification even though a transmission error has occurred.

  If your administrator has requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retain time expires.

- The operator has deleted the file.

Note: Notification might be delayed to improve system performance.

-n *copies*
Prints the specified number of copies of each file. You can specify a value from 1 to 32640. This option overrides the **copies** job attribute. The default value is the copies value in the printer definition, or, if none is specified, one copy.

Note: VTAM-controlled printers and some IPP-enabled printers do not support printing more than one copy; in this case, only one copy prints. This option is ignored when data is sent to an e-mail destination; in this case only one copy is sent.

-o *option*
Specifies an option, that is, one or more attribute value assignments in the format *attribute*=*value*, separated by spaces.

- If a value contains spaces, enclose the value in single or double quotation marks:

```
attribute='value with spaces'
attribute="value with spaces"
```

- If an option contains spaces or characters that can be interpreted by the shell, such as **$**, **&**, **(**, **)**, **>**, **<**, **|**, **'**, **" #**, and so on, enclose the option in single or double quotation marks:

```
-o 'attribute1=value1 attribute2=value2'
-o "attribute='value with spaces'"
-o "attribute=value(1)"
```

  For information about how the shell interprets special characters, refer to *z/OS UNIX System Services User's Guide*.

- If both value and option require quotation marks, do either of these things:
  - Use two pairs of double quotation marks and place a backslash before each quotation mark that surrounds the value:

```
-o "attribute=\"value with spaces\""
```

  - Use different quotation marks around the option and value, for example:

```
-o 'attribute="value with spaces"'
-o "attribute='value with spaces'"
```

See "Attribute Listing" on page 85 for a list of the attributes you can specify to describe the job and all the files in it.

Instead of entering a string of attributes on the command line, you can store attributes and values in a file. You use a special attribute called **attributes** to specify the file. See "Creating an Attributes File" on page 84 for how to create an attributes file and "Specify an Attributes Files" on page 56 for an example of specifying one.

You can also set the **AOPOPTIONS** environment variable to a string of attributes and values. The **lp** command treats these attributes as if you had specified them before any other values of the **-o** option on the command line. See "Specify the AOPOPTIONS Environment Variable" on page 56 for an example of using the **AOPOPTIONS** environment variable.

If you specify an attribute more than once, the **lp** command uses the last value.

-s Suppresses the message that the **lp** command returns when Infoprint Server has accepted the request. This message contains the Infoprint Server job ID. You must know the job ID to query or cancel the job.

-t *"description of file"*
A description of the file, which can be printed as the title on a separator page, a page that might be printed before or after the file. If the file is sent to an e-mail destination, this description is the subject of the e-mail. You can specify up to 60 characters. If the text contains spaces or characters that the shell might interpret, enclose the text in single or double quotation marks. This option overrides the **title-text** job attribute. For information about the default value, see "title-text" on page 103.

Note: Whether a title is printed on a separator pages depends on how the administrator has configured the separator page.

-w Writes a message to the terminal when the file is removed from the system spool for any reason. Some reasons are:

- The file has finished printing.
- The file has been transmitted to a LAN printer or to the z/OS UNIX sendmail function. You might receive notification before the file has finished printing or has been sent to the e-mail destination. You might receive notification even though a transmission error has occurred.

  If your administrator has requested that Infoprint Server retain files on the system spool after transmission, you receive notification after the retain time expires.
- The operator has deleted the file.

Note: Notification might be delayed to improve system performance.

Operand

filename
The path name of each file that you want to print or send to an e-mail destination. To specify data from standard input (keyboard data or the output from another command), omit the file name or specify a dash (**–**) as the file name. To print an MVS data set, specify **//** before the file name.

Rules:

1. If the data stream must be transformed to a different data format, you can submit only one file at a time with each **lp** command.
2. If you specify more than one file with the same **lp** command, all files must have the same data format. For example, all files must be PostScript files or text files.

Results

After Infoprint Server accepts the print job, the **lp** command returns an Infoprint Server job ID, which you can use to query and cancel the job. For example, you might receive a message such as:

```
AOP007I Job 14584 successfully spooled to myprinter.
```

The Infoprint Server job ID can help the system operator find your job on the JES spool. The job ID field of the data set that Infoprint Server allocates on the JES spool contains the Infoprint Server job ID.

The Infoprint Server job ID is different, however, from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands return the z/OS job ID.

Sending a File to an E-mail Destination

With the **lp** command, you can send the file to an e-mail destination instead of to a printer. When you send a file to an e-mail destination, your administrator can specify the e-mail address list of the recipients in the printer definition for the e-mail destination in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the E-mail Address List in an Alias File" on page 110.

The e-mail has the following characteristics:

- The file is an e-mail attachment. The name of the attachment is the name specified in the **sysout-dataset-name** job attribute. If this attribute is not specified, the name of the attachment is the last 8 characters of the file name. A pound sign (#) is used in the file name instead of any character that the system does not allow in a file name on the JES spool; for example a slash or a period is replaced with a pound sign.

  The name of the attachment contains an extension that indicates the type of data in the file. For example, `txt` indicates text data, and `pdf` indicates PDF data.
- The subject of the e-mail is the value specified in the **-t** option or in the **title-text** job attribute. If none is specified, the subject is the title specified in the Allocation section of the printer definition. If none is specified, the subject is the ID of the user who issued the **lp** command.
- The sender is the user ID of the user who issued the **lp** command.
- You can receive replies from the e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. To receive replies, use the z/OS UNIX **mail** or **mailx** command.

Examples

Print a File on the Default Printer

To submit the file `File1` to your default printer, enter the command:

```
lp File1
```

Print a File on a Specified Printer

To submit the file `File1` to the printer `fred`, enter the command:

```
lp -d fred File1
```

Print a File on an Undefined LAN Printer

You want to print the file `File1` on a LAN printer at a remote site. Your administrator has not defined this printer. You must specify:

- The name that your administrator has defined to represent all remote printers, for example, `remote`
- The printer's Internet Protocol (IP) address
- The remote print queue

Enter the command:

```
lp -d remote -o "print-queue-name=text
   printer-ip-address=leo.boulder.ibm.com" File1
```

Print an MVS Data Set

To submit the MVS data set *hlq*.FILE1.LISTPS to your default printer, where *hlq* is your user ID, enter the command:

```
lp //FILE1.LISTPS
```

To submit the MVS data set FILE2.LISTPS to your default printer, enter the command:

```
lp "//'FILE2.LISTPS'"
```

Print a Multi-Document Job

To submit the files File1 and File2 to the default printer, enter the command:

```
lp File1 File2
```

Each file is spooled to the printer separately.

Print a File-Reference Document

A *file-reference document* is a list of similar printable files that are separated by spaces, tabs, or new lines. For example, the file bills.list contains a list of files, each containing one customer's monthly statement. It looks like this:

```
40009801.dec97
40009802.dec97
40009803.dec97
40009804.dec97
⋮
```

To print all the files listed in bills.list on your default printer, enter the command:

```
lp -o document-type=file-reference bills.list
```

The files are concatenated and printed as a single file.

Transform and Print a job

If your installation has installed Infoprint Server Transforms, you can submit a job in a format different from the ones the printer accepts. Infoprint Server Transforms will transform the data to a format the printer accepts. For data to be transformed, your administrator must configure the printer definition to use transforms. For more information about the Infoprint Server Transforms product, see "Transform a File to AFP Format?" on page 26 and "Transform a File from AFP Format?" on page 27.

To print the PCL file sample.pcl on the AFP printer printer1, enter the command:

```
lp -d printer1 sample.pcl
```

If you want to specify options for a file that is being transformed to AFP, you must use the filter-options attribute with the lp command. For example, to print pages 3–10 of the PCL file sample.pcl on the AFP printer printer1 as an overlay, enter the command:

```
lp -d printer1 -o "filter-options='-p 3-10 -t overlay'" sample.pcl
```

If you want to specify job attributes for a file that is being transformed from AFP, you do not use the filter-options attribute with the lp command. You only use filter-options to specify **-c** and **-i** options. For example; to print the AFP file sample.afp on the PCL printer PCLPRT and printing in duplex, enter the command:

```
lp -d PCLPRT -o 'duplex=yes' sample.afp
```

To print the AFP file sample.afp on the PCL printer PCLPRT using the transform class US and print in duplex, enter the command:

```
lp -d PCLPRT -o "filter-options='-c us' duplex=yes" sample.afp
```

Print Multiple Copies of Each File

To print two copies of each file on the default printer, enter one of these commands:

```
lp -n 2 Title Contents Body1 Body2 Append

lp -o copies=2 Title Contents Body1 Body2 Append
```

This command prints two copies of Title, followed by two of Contents, and so forth for each file in the job.

Note: VTAM-controlled printers and some IPP-enabled printers do not support printing more than one copy; in this case, only one copy prints. If the file is send to an e-mail destination instead of to a printer, only one copy is sent.

Print a File on Both Sides of the Paper

To print file File1 on the default printer and to print it on both sides of the paper, enter the command:

```
lp -o duplex=yes File1
```

Specify an Attributes Files

To print file File5 on the default printer and to specify the two attributes files default.att and special.att, enter the command:

```
lp -o "attributes=default.att attributes=special.att" File5
```

Suppose that the file default.att contains these lines:

```
input-tray=bottom
duplex=yes
output-bin=collator
```

The file special.att contains these lines:

```
input-tray=top
copies=5
title-text='Special Report'
```

The preceding command is equivalent to this command:

```
lp -o "input-tray=top duplex=yes output-bin=collator
   copies=5 title-text='Special Report'" File5
```

The value of **input-tray** in special.att overrides the value in default.att because you specified special.att last.

Note: These examples assume that the attributes files are in the current directory, or that you have set the **AOPPATH** environment variable to include the directories where the attributes files reside. If this is not the case, you would specify the attributes files by their absolute path names.

Override an Attribute Value in an Attributes File

To print file File1 on the default printer and override the value of **yes** for the **duplex** attribute specified in the default.att attributes file, enter the command:

```
lp -o "attributes=default.att duplex=tumble" File1
```

Specify the AOPOPTIONS Environment Variable

To set the **AOPOPTIONS** environment variable to your address, add a line like the following one to your **.profile** file:

```
export AOPOPTIONS="address-text={'13 Division St.' 'Foxboro, MA 02035'}"
```

Until you reset the **AOPOPTIONS** environment variable, every **lp** command you issue includes this values. For example, the following command:

```
lp myfile.ps
```

is equivalent to:

```
lp -o "address-text={'13 Division St.' 'Foxboro, MA 02035'}" myfile.ps
```

Because the **lp** command reads the value of the **AOPOPTIONS** environment variable before the options you specify on the command line, you can override the values of this variable. For example, if you want a single job delivered to a different address, enter:

```
lp -o "address-text={'999 Eclipse Alley' 'Pawtucket, RI 02860'}" myfile.ps
```

Request Notification by Message

To print file `File1` on the default printer and to receive a message when the file is printed, enter the command:

```
lp -w File1
```

Note: If the printer is a LAN printer, the **lp** command writes a message when the file is transmitted to the printer. When you receive the message, the file might not actually have finished printing.

Submit and Hold a Job

To submit file `File1` to the default printer and to hold it so that it does not print until the operator releases it, enter the command:

```
lp -o hold=true File1
```

Specify a Code Page for ASCII Files

To print the files `File1` and `File2` and to specify the code page `ISO8859-1`, enter the command:

```
lp -d Printer1 -o document-codepage=ISO8859-1 File1 File2
```

Print from Standard Input

You can use the **lp** command to print the output from other commands. For example, to print a list of all the files in the current directory, enter:

```
ls -la | lp
```

Paginate Line Data and Print with a Header on Each Page

If your administrator has specified the LPD compatibility filter (**lpd_compat.so**) for the printer in the Printer Inventory, you can specify filter options that are equivalent to the FILTER, WIDTH, and LINECOUNT options of the z/OS Communications Server (TCP/IP) LPR command. The LPD compatibility filter can be used with text and line data when you print on an AFP printer or a JES line printer. For a description of the options that the LPD compatibility filter supports, see “filter-options” on page 91.

To print data set `MYDATA`, which contains line data, on the AFP printer `afpprinter`, with a header on each page, a maximum width of 80 characters, and a maximum length of 60 lines, enter the command:

```
lp -d afpprinter -o "filter-options='-f p -w 80 -l 60'" "//'MYDATA'"
```

Send Files to an E-mail Destination

To send files `File1` and `File2` to the e-mail address list in printer definition `deptmail`, specify a subject for the e-mail, and specify a form definition that is used when the AFP data is converted to PDF format, enter the command:

```
lp -d deptmail -t "Monthly Report" -o "form-definition=F1MYDEF" File1 File2
```

This example assumes that the AFP to PDF transform is requested for AFP data in the printer definition named `deptmail`.

Results: The recipients listed in printer definition `deptmail` receive two e-mails:

- The sender of the e-mails is the user ID of the user who issued the **lp** command.
- File `File1` is attached to one e-mail, while file `File2` is attached to another e-mail. The name of the attachments are: `FILE.pdf` and `FILE2.pdf`. The files are in PDF format and can be viewed and printed with Adobe Acrobat Reader.
- The subject of both e-mails is `Monthly Report`.

Environment Variables

The **lp** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file, **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

AOPOPTIONS
Specifies a string of attributes and values that the **lp** command includes before the values of the **-o** option.

AOPPATH Defines the directory path that the **lp** command searches for attributes files. The default is your current directory. If the directory where an attributes file resides is not included in the value of **AOPPATH**, you can specify the file by its absolute path name.

LPDEST Names the default printer. This variable takes precedence over **PRINTER**.

PRINTER Names the default printer if **LPDEST** is not defined.

NLSPATH Names the directory paths that the **lp** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Exit Values

0 Infoprint Server accepted the request.

>0 An error occurred that prevented Infoprint Server from accepting the request. Some possible errors are:

- The command syntax is not valid.
- The selected printer cannot print the type of data in one of the files.
- The selected printer does not support one of the specified job attributes.
- Infoprint Server is not available.
- There was an error in reading the Infoprint Server configuration file.

Portability

The **-m**, **-o**, **-s**, **-t**, and **-w** options are extensions to the POSIX.2 standard. There are no extensions to the XPG4.2 standard for the **lp** command.

lpstat—Show Printer Names and Locations and Status of Print Jobs

Format

lpstat [**-dt**] [**-a** [*printername* ...]] ... [**-o** [*printername* ...]] ...

[**-p** [*printername* ...]] ... [**-u** [*userid* ...]] ... [*jobid* ...]

Description

lpstat writes printer definition names, location information specified in the printer definitions, and the status of jobs to standard output.

For printer definitions in the Infoprint Server Printer Inventory, the **lpstat** command returns the following information:

- The name of the printer definition
- The number of jobs submitted to the printer definition using the Print Interface component of Infoprint Server
- The location information in the printer definition.
- The description information in the printer definition

For jobs that were submitted through the Print Interface component of Infoprint Server, the **lpstat** command returns the following information:

- The Infoprint Server job ID. The Infoprint Server job ID is a unique job ID assigned to each print job. You can use it to cancel the job with the **cancel** command.

  The Infoprint Server job ID can help the system operator find your job on the JES spool. In most cases, the job ID field of data sets that Infoprint Server allocates on the JES spool contains the Infoprint Server job ID.

  The Infoprint Server job ID is different, however, from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands return the z/OS job ID.
- The user ID of the person who submitted the job.
- The state of each file in the job:

  pending The file is waiting to print.

  processing The file has been placed on the JES spool and selected for processing. It may be:
  - Being transmitted to a local area network (LAN) printer or to a print server
  - Printing

  held The file is held on the JES spool and cannot print for one of these reasons:
  - The user specified **hold=true** when submitting the job.

    Note: JES3 does not recognize a job that is held for this reason and returns **pending**.
  - The operator held the job.

  completed The file has been processed successfully. It remains on the JES spool for one of these reasons:

- Other files in the job are still being processed. The file will be removed from the spool after all files in the job have been processed.
- Your administrator has specified that files should be retained after transmission to a LAN printer or to a print server. The file will be removed from the spool when the retention period expires.

failed Processing has failed. The file remains on the JES spool for one of these reasons:

- Transmission to a LAN printer or to a print server has failed. Your administrator has specified that files should be retained after transmission. The file will be removed from the spool when the retention period expires.
- An error occurred during processing. The file is held.

purged The file was deleted before printing.

- The data format of the job specified in the **document-format** job attribute or determined by Infoprint Server.
- The number of bytes in each file in the job.
- The name of each file or file-reference document in the job.

  For jobs submitted to the Print Interface subsystem, the filename is in the following format:

  job-name.job-id.dataset-name

  where:

  job-name
  The name of the z/OS job. The job name can help the system operator locate the data set on the JES spool.

  job-id
  The ID that z/OS assigned to the job. The job ID can help the system operator locate the data set on the JES spool.

  dataset-name
  The name of the data set specified in the DSNAME parameter on the DD JCL statement for the data set. This name is the last qualifier of the fully-qualified data set name on the JES spool. If the DSNAME parameter was not specified, this field is blank.

When **lpstat** returns information about multiple jobs, the order is not significant. The first job listed may not be the next job to print.

Options

-a [*printername* **...]**
Displays the names and locations of the specified printers. If you do not specify a printer name, this option displays the names and locations of all printers defined in the Printer Inventory.

If you specify more than one printer name in the **-a** option, enclose the entire value in quotation marks. Or, you can repeat the **-a** option.

-d Displays the name and location of the default printer that the administrator has defined. If there is no default printer, **lpstat** returns an error message.

Note: This option does not display the name or location of a default printer that you defined with the LPDEST or PRINTER environment variable. To display the values of these variables, use the z/OS UNIX **echo** command.

-o [*printername* **...]**
Displays information about the specified printers and all jobs that you submitted to the specified printers. If you do not specify a printer name, this option displays information about printers defined in the Printer Inventory and all jobs you submitted to them through the Print Interface component of Infoprint Server.

If you specify more than one printer name in the **-o** option, enclose the entire value in quotation marks. Or, you can repeat the **-o** option.

-p [*printername* **...]**
Displays the names and locations of the specified printers. If you do not specify a printer name, this option displays the names and locations of all printers defined in the Printer Inventory.

If you specify more than one printer name in the **-p** option, enclose the entire value in quotation marks. Or, you can repeat the **-p** option.

-t Displays information about all printers defined in the Printer Inventory and all jobs submitted to them through the Print Interface component of Infoprint Server.

-u [*userid* **...]**
Displays information about all jobs that the specified users submitted to any printer. If you specify **-u** without a user name, this option displays information about all jobs that all users submitted to any printer. If you do not specify **-u**, **lpstat** displays information about all jobs that you submitted to any printer.

The user ID is case sensitive. Use the exact uppercase and lowercase characters.

If you specify more than one user name in the **-u** option, enclose the entire value in quotation marks. Or, you can repeat the **-u** option.

Operand

jobid **...**
Identifies the job you want to display information about. Specify the Infoprint Server job ID, not the z/OS job ID.

The **lp** command and AOPPRINT JCL procedure return the Infoprint Server job ID when a job is accepted for printing. Infoprint Server also can return the Infoprint Server job ID to you when you submit a job from a remote system.

Examples

Display the Names and Locations of All Printers

To display the names of all printer definitions in the Infoprint Server Printer Inventory and the location information in the printer definition, enter:

```
lpstat -a
```

Display the Name and Location of the Default Printer

To display the name and location of the default printer, enter:

```
lpstat -d
```

Display Information about Selected Jobs

To display the status of the jobs whose Infoprint Server job IDs are `14` and `16`, enter:

```
lpstat 14 16
```

Display Information about All Jobs that You Submitted

To display the status of all the jobs that you submitted to any printer definition, enter:

```
lpstat
```

Display Information about All Jobs Submitted by a User

To display the status of all jobs that user `MARTHA` submitted to any printer definition, enter:

```
lpstat -u MARTHA
```

Display Information about a Printer and All Jobs that You Submitted to It

To display the location of printer `Printer1` and the status of all jobs that you submitted to it, enter:

```
lpstat -o Printer1
```

Display Information about Several Printers and All Jobs that You Submitted to It

To display the location of printers `Printer1` and `Printer2` and the status of all jobs that you submitted to them, enter:

```
lpstat -o "Printer1 Printer2"
```

Display Information about All Printers and All Jobs

To display the status of all printers and all jobs that have been submitted by all users in the system, enter:

```
lpstat -t
```

Environment Variables

The **lpstat** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file, **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **lpstat** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Exit Values

0 Infoprint Server accepted the request.

>0 An error occurred that prevented Infoprint Server from accepting the request. Some possible errors are:

- The command syntax is not valid.
- Infoprint Server is not available.
- There was an error in reading the Infoprint Server configuration file.

Portability

There are no extensions to any Portable Operating System Interface for Computer Environments (POSIX) standard or to the XPG4.2 standard for the **lpstat** command.

pcl2afp—Transform PCL Data to AFP Data

Format

pcl2afp [**-a** *imagetype*] [**-c** *transformclass*] [**-o** *outputfile*]

[**-p** *pagerange*] ... [**-t** *outputtype*] [*inputfile ...*]

Description

The **pcl2afp** command transforms a Printer Control Language (PCL) 5 or 5e data stream file into an Advanced Function Presentation (AFP) data stream file. This command is part of the Infoprint Server Transforms product.

If you specify multiple values of the same option, **pcl2afp** uses the last value that you specified, with the exception of the **-p** option. Up to 20 values of the **-p** option accumulate.

When using the **pcl2afp** command, you can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (**-**) as the file name, **pcl2afp** uses standard input. The output file name is also optional; if you do not specify one, the **pcl2afp** command writes the results to standard output.

Options

Note: You can use the **filter-options** job attribute with the **lp** command to pass any of these options except **-o** *outputfile* to the AFP to PCL transform.

-a *imagetype*
Determines the type of AFP data stream image to generate for each page in the PCL file.

Values are:

io1-g4 Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because it takes up less space on the hard disk, and it prints faster.

Notes:

1. Some older AFP printers do not support printing with an image type of **io1-g4**. For these printers, specify an image type of **io1-mmr** because it is the compressed image type that they support. This image type results in faster printing than uncompressed image types.
2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

im1 IM1 image. This type of image is not compressed.

io1 IOCA image. This type of image is not compressed.

io1-mmr
Compressed IOCA image in Modified Modified Read (MMR) format.

-c *transformclass*
Specifies the name of a transform class that your administrator has defined. The transform class determines the following options:

- The length and width of the generated image
- The page margins
- The resolution of the output image
- The amount of memory that the transform allocates

Ask your administrator for the name of a transform class suitable for the printer and the type of job.

Note: If the transform class specifies a resolution that the printer does not support, PSF prints the image under most conditions, but with degraded results.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you do not specify an output file, the result is written to standard output (STDOUT). If you specify more than one output file, the last path and file name are used.

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required, for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, allocate and catalog the data set before you run this command. Allocate a data set that is large enough to hold the output data stream; the size of the output data stream depends on the complexity of the document and the type of image compression you select in the **-a** option. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with the following characteristics:

- Record format: VBM
- Record length: 8K (8192) bytes or larger

-p *pagerange*

Specifies that the output should contain only selected pages. Up to 20 values of the **-p** option accumulate.

The **-p** option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered `i, ii, 1, 2, 3, 4`, specify `-p 6`.

Examples of values include:

`-p even` Write even pages.

`-p odd` Write odd pages.

`-p 1-10` Write the first through tenth pages.

`-p 10-` Write pages from the tenth page until the end of the file.

`-p 1 -p 3 -p 6`
Write the first, third, and sixth pages.

-t *outputtype*

Determines the type of output to generate.

Values are:

document
Printable document.

overlay
Graphic image that can be printed on each page of a printable document.

pagesegment
Graphic image that can be embedded in a printable document.

Note: When generating overlays or page segments from multiple-page documents, you might want to use the **-p** option to select pages. Otherwise, one overlay or page segment is created for each page of the input file.

Operand

inputfile
Specifies an input file to be transformed. If you specify more than one input file name, the **pcl2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

In addition, you can specify PCL inline resource files as input files to the **pcl2afp** command. The file name of the inline resource file must precede the file name of the PCL printable file so that **pcl2afp** concatenates the files in the correct order.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **pcl2afp** uses standard input.

Limitations

- The PCL to AFP transform produces monochrome output.
- PCL data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in a form definition resource, the **pcl2afp** command ignores the device commands in the print data. To access those device functions, you must specify them in the form definition or attributes file, or on the print command.
- Resolution conversion algorithms may produce a degraded appearance when used to reduce the resolution of a data stream. For this reason, **pcl2afp** may degrade the appearance of higher-resolution data streams when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- There are subtle differences between PCL4 and PCL5e when it comes to handling fonts. While many PCL4 files work with **pcl2afp**, some may not produce the expected output.

Examples

Transform a File, Specifying Transform Class

To transform the PCL file `myfile.pcl` into an AFP data stream, using the `a4_300` transform class, and write the result to a file called `myfile.afp`, enter:

```
pcl2afp -c a4_300 -o myfile.afp myfile.pcl
```

Transform and Print a File, Specifying Image Type

To transform the PCL file `myfile.pcl` into an AFP data stream as an IO1-MMR image, and send the result to the default printer with the **lp** command, enter:

```
pcl2afp -a io1-mmr myfile.pcl | lp
```

Transform a File Using Redirection

To transform the PCL file `input.pcl` into the AFP output file called `output.afp` enter:

```
pcl2afp <input.pcl> output.afp
```

Note: You can use redirection operators only with UNIX files.

Transform Multiple Files and Concatenate the Output

To transform the PCL files `input.01.pcl`, `input.02.pcl`, ... `input.xx.pcl` into one AFP output file called `output.afp` enter:

```
pcl2afp -o output.afp input.01.pcl input.02.pcl ... input.xx.pcl
```

Transform a UNIX File to an MVS Data Set

To transform file `input.pcl` into an existing, cataloged MVS output data set called *hlq*`.OUTPUT.AFP(`*member*`)`, where *hlq* is your user ID, enter:

```
pcl2afp -o "//'hlq.OUTPUT.AFP(member)'" input.pcl
```

Transform an MVS Data Set, Writing the Output to a UNIXFile

To transform the MVS data set *hlq*`.INPUT.PCL(`*member*`)`, where *hlq* is your user ID, into an output file called `output.afp` enter:

```
pcl2afp -o output.afp "//'hlq.INPUT.PCL(member)'"
```

Environment Variables

The **pcl2afp** command uses the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **pcl2afp** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

Exit Values

0 The data were transformed successfully.

>0 An error occurred.

pdf2afp and ps2afp—Transform PDF or PostScript Data to AFP Data

Format

pdf2afp [**-a** *imagetype*] [**-c** *transformclass*] [**-l** *length*] [**-o** *outputfile*]

[**-p** *pagerange*] ... [**-r** *resolution*] [**-t** *outputtype*] [**-w** *width*]

[**-x** *xmargin*] [**-y** *ymargin*] [*inputfile...*]

ps2afp [**-a** *imagetype*] [**-c** *transformclass*] [**-g** *pagerange*] ...

[**-i** *initializationfile...*] [**-l** *length*] [**-o** *outputfile*] [**-p** *pagerange*] ...

[**-r** *resolution*] [**-t** *outputtype*] [**-w** *width*] [**-x** *xmargin*] [**-y** *ymargin*]

[*inputfile...*]

Description

The **ps2afp** command and its alias, the **pdf2afp** command, convert a PostScript or Portable Document Format (PDF) data stream file into an Advanced Function Presentation (AFP) data stream file. These commands are part of the Infoprint Server Transforms product.

If the Kanji AFP Print feature of Infoprint Server Transforms is installed, you can transform Japanese PostScript and PDF documents to AFP format. The **pdf2afp** and **ps2afp** commands map a variety of DBCS fonts to the Heisei Kaku Gothic or Heisei Mincho font.

If you specify multiple values of the same option, **ps2afp** uses the last value, with the exception of the **-g** and **-p** options. Up to 20 values of the **-p** option, or any number of values of the **-g** option, accumulate.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (**-**) as the file name, **ps2afp** reads standard input. The output file name is also optional; if you do not specify one, the **ps2afp** command writes the results to standard output.

Options

Note: You can use the **filter-options** job attribute with, for example, the **lp** command to pass any of these options except **-o** *outputfile* to the PostScript or PDF to AFP transform.

-a *imagetype*

Determines the type of AFP data stream image to generate for each page in the PostScript or PDF file.

Values are:

io1-g4 Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because it takes up less space on the hard disk, and it prints faster.

Notes:

1. Some older AFP printers do not support printing with an image type of **io1-g4**. For these printers, specify an image type of **io1-mmr** because it is the compressed image type supported by these printers. This image type results in faster printing than uncompressed image types.
2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

im1 IM1 image. This type of image is not compressed.

io1 IOCA image. This type of image is not compressed.

io1-mmr
Compressed IOCA image in Modified Modified Read (MMR) format.

-c *transformclass*
Specifies the name of a transform class that your administrator has defined. The transform class determines the following options:

- The initial transform configuration
- The fonts used in the transformed files

Ask your administrator for the name of a transform class suitable for the type of job.

-g *pagerange*
Specifies that the output should contain only selected pages. Any number of values of the **-g** option accumulate. The **-g** option can be used only for PostScript documents that conform to the Data Stream Compatibility (DSC) standard. It is not valid for PDF documents.

The difference between the **-g** and **-p** options is that **-g** identifies pages by the label specified with the PostScript **%%Page** command (usually a page number), while **-p** counts them by their actual sequence in the document. For example, to write only the last page of a document whose pages are numbered `i, ii, 1, 2, 3, 4`, specify `-g 4` or `-p 6`.

Note: Unlike the **-p** option, the **-g** option does not support the **even** and **odd** keywords.

Examples of values include:

`-g iii-vi` Write pages iii through vi.

`-g 1-10` Write pages 1 through 10.

`-g 10-` Write pages from page 10 until the end of the job.

`-g 1 -g 3 -g 6`
Write pages 1, 3, and 6.

`-g 3-1 3-28` Write pages 3-1 through 3-28.

-i *initializationfile*
Specifies one or more ASCII PostScript files that are prepended to the job to set up and initialize the PostScript transform. If you specify more than one file, they are processed in the order that you specify them. The **-i** option is not valid for PDF documents.

-l *length*
Specifies the length of the generated image. In general, specify the length

of the physical page. See “Usage Notes” on page 75 for more information about this option. Specify a number followed by one of the following units:

in Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point; pel values cannot.

Values are:

11i	11 inches, the default for all printers
0.1334in to **53in**	Inch values for 240-pel printers
0.1067in to **53in**	Inch values for 300-pel printers
0.0667in to **53in**	Inch values for 480-pel printers
0.0534in to **53in**	Inch values for 600-pel printers
3.3867mm to **1346.2mm**	Millimeter values for 240-pel printers
2.7094mm to **1346.2mm**	Millimeter values for 300-pel printers
1.6934mm to **1346.2mm**	Millimeter values for 480-pel printers
1.3547mm to **1346.2mm**	Millimeter values for 600-pel printers
32pel to **12720pel**	Pel values for 240-pel printers
32pel to **15900pel**	Pel values for 300-pel printers
32pel to **25440pel**	Pel values for 480-pel printers
32pel to **31800pel**	Pel values for 600-pel printers

Examples of values include:

```
-l 40mm
-l 200.5mm
-l 13in
-l 5280
-l 5280pel
```

Note: If a text margin is already built into the file, try **-l 11in** to set the length to 11 inches.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required, for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, allocate and catalog the data set before you run this command. Allocate a data set that is large enough to hold the

output data stream; the size of the output data stream depends on the complexity of the document and the type of image compression you select in the **-a** option. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with the following characteristics:

- Record format: VBM
- Record length: 8K (8192) bytes or larger

-p *pagerange*
Specifies that the output should contain only selected pages. Up to 20 values of the **-p** options accumulate.

The difference between the **-p** and **-g** options is that **-p** counts pages by their actual sequence in the document, while **-g** identifies them by page label. For example, to write only the last page of a document whose pages are numbered `i, ii, 1, 2, 3, 4`, specify `-p 6` or `-g 4`.

Examples of values include:

`-p even` Write even pages.

`-p odd` Write odd pages.

`-p 1-10` Write the first through tenth pages.

`-p 10-` Write pages from the tenth page until the end of the job.

`-p 1 -p 3 -p 6`
Write the first, third, and sixth pages.

-r *resolution*
Specifies the resolution of the output image. Select the correct resolution for the printer on which you intend to print the image.

Values are:

240 240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers).

pels per inch (for example, IBM 4019, 4028, 4029, and 4039 printers and some Hewlett-Packard printers)

480 480 pels per inch

600 600 pels per inch (for example, IBM Infoprint 60 and Infoprint 4000 printers), the default

Note: If you specify a resolution that the printer does not support, PSF prints the image under most conditions, but with degraded results.

-t *outputtype*
Determines the type of output to generate.

Values are:

document
Printable document.

overlay
Graphic image that can be printed on each page of a printable document.

pagesegment
Graphic image that can be embedded in a printable document.

Note: When generating overlays or page segments from multiple-page documents, you might want to use the **-g** or **-p** option to select pages. Otherwise, one overlay or page segment is created for each page of the input file.

-w *width*

Specifies the maximum width of the generated image. In general, specify the width of the physical page. See "Usage Notes" on page 75 for more information about this option. Specify a number followed by one of the following units:

in Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point; pel values cannot.

Values are:

8.5in	8.5 inches, the default for all printers
0.1334in to **25.5in**	Inch values for 240-pel printers
0.1067in to **25.5in**	Inch values for -pel printers
0.0667in to **25.5in**	Inch values for 480-pel printers
0.0534in to **25.5in**	Inch values for 600-pel printers
3.3867mm to **647.7mm**	Millimeter values for 240-pel printers
2.7094mm to **647.7mm**	Millimeter values for -pel printers
1.6934mm to **647.7mm**	Millimeter values for 480-pel printers
1.3547mm to **647.7mm**	Millimeter values for 600-pel printers
32pel to **6120pel**	Pel values for 240-pel printers
32pel to **7650pel**	Pel values for -pel printers
32pel to **12240pel**	Pel values for 480-pel printers
32pel to **15pel**	Pel values for 600-pel printers

Examples of values include:

```
-w 40mm
-w 200.5mm
-w 13in
-w 4000
-w 4000pel
```

Note: If a text margin is already built into the file, try **-w 8.5in** to set the width to 8.5 inches.

-x *xmargin*

Specifies a horizontal margin or border around the generated image to avoid the non-printable areas of some printers. See "Usage Notes" on page 75 for more information about this option. Specify a number followed by one of the following units:

in Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point; pel values cannot.

Values are:

0 Zero, the default for all printers

0in to **12.75in** Inch values for all printers

0mm to **323.85mm**
Millimeter values for all printers

0pel to **3060pel**
Pel values for 240-pel printers

0pel to **3825pel**
Pel values for -pel printers

0pel to **6120pel**
Pel values for 480-pel printers

0pel to **7650pel**
Pel values for 600-pel printers

Notes:

1. Because the X value specifies margins on *both* the left and right sides of the page, the X value can be no more than half of the width (**-w**) of the generated image. For example, if you specify a width of 8 inches, then the X value can be no larger than 4 inches. If you specify an X value of 5 inches, a blank page is printed because the sum of the left and right margins exceeds the width of the paper.
2. The X value does not shift the image on the page. The image is clipped if it is defined to print in the left or right margin.

-y *ymargin*
Specifies a vertical margin or border around the generated image to avoid the non-printable areas of some printers. See “Usage Notes” on page 75 for more information about this option. Specify a number followed by one of the following units:

in Inches

mm Millimeters

pel Pels, the default unit

Inch values and millimeter values can contain a decimal point; pel values cannot.

Values are:

0 Zero, the default for all printers

0in to **26.5in** Inch values for all printers

0mm to **673.1mm**
Millimeter values for all printers

0pel to **6360pel**
Pel values for 240-pel printers

0pel to **7950pel**
Pel values for 300-pel printers

0pel to **12720pel**
Pel values for 480-pel printers

0pel to **15900pel**
Pel values for 600-pel printers

Notes:

1. Because the Y value specifies margins on *both* the top and bottom of the page, the Y value can be no more than half of the length (**-l**) of the generated image. For example, if you specify a length of 12 inches, then the Y value can be no larger than 6 inches. If you specify a Y value of 7 inches, a blank page is printed because the sum of the top and bottom margins exceeds the length of the paper.
2. The Y value does not shift the image on the page. The image is clipped if it is defined to print in the top or bottom margin.

Operand

inputfile
Specifies an input file to be transformed. If you specify more than one input file name, the **ps2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

In addition, you can specify PostScript inline resource files as input files to the **ps2afp** command. The file name of the inline resource file must precede the file name of the PostScript or PDF print file so that **ps2afp** concatenates the files in the correct order.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **ps2afp** uses standard input.

Usage Notes

- The PostScript or PDF file may contain the commands **letter** and **legal**. If these commands are present in the PostScript or PDF file, the size of the transformed image may not be what you expect. The **letter** and **legal** commands override the length and width values specified for the transform.
- If the **letter** and **legal** commands are not used, the position of PostScript or PDF data on the page depends on the interaction of the length and width values specified for the transform with the form definition you use. In general, to position data on the page:
  - Use **-l** and **-w** to set the physical page dimensions.
  - Use a form definition that specifies zero vertical offset and zero horizontal offset or specify X and Y offsets of 0 when you submit the print job.
- Use **-x** and **-y** to avoid any areas that your printer cannot print. These options do not shift the image on the page. If the image is defined to print in the unprintable areas, it is clipped.

Limitations

- The Postscript to AFP and PDF to AFP transform produces monochrome output.
- PostScript data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in a form definition resource, the **ps2afp** command

ignores the device commands in the print data. To access those device functions, you must specify them in the form definition or attributes file, or on a print command, when you print the job.

- Resolution conversion algorithms may produce a degraded appearance when used to reduce the resolution of images imbedded in a data stream. For this reason, **ps2afp** may degrade the appearance of higher-resolution images when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- This transform *cannot* create the AFP FS45 image type, which the IBM Infoprint Color 130 Plus printer requires. However, the PostScript to AFP and PDF to AFP transform available with Infoprint Manager for AIX can create the FS45 image type. If your installation has installed Infoprint Manager for AIX, your administrator can set up the printer definition for the IBM Infoprint Color 130 Plus printer to run the PostScript to AFP and PDF to AFP transform on Infoprint Manager for AIX.

Examples

Transform a Job, Specifying Image Size

To transform the PostScript file `myfile2.ps` into an AFP data stream, with an image that is 8 inches high and 5 inches wide, and write the result to a file called `myfile2.afp`, enter:

```
ps2afp -l 8in -w 5in -o myfile2.afp myfile2.ps
```

Transform and Print a Job, Specifying Resolution

To transform the PDF file `myfile1.pdf` into an AFP data stream, and then submit it to the 4019 printer called `robin`, enter:

```
pdf2afp -r  myfile1.pdf | lp -d robin
```

Note: You need to specify a resolution of pels (`-r`) because the 4019 is a -pel resolution printer. The default resolution for the **pdf2afp** command is 600 pels.

Transform a Job, Specifying Transform Class

To transform the PostScript file `myfile.ps` into an AFP data stream, using the `bigjob` transform class, and write the result to a file called `myfile.afp`, enter:

```
ps2afp -c bigjob -o myfile.afp myfile.ps
```

Transform a Job, Using Redirection

To transform the PostScript file `input.ps` into the AFP output file called `output.afp` enter:

```
ps2afp <input.ps> output.afp
```

Note: You can only use redirection operators with z/OS UNIX files.

Transform Multiple Files and Concatenate the Output

To transform the PostScript files `input.01.ps`, `input.02.ps`, ... `input.xx.ps` into one AFP output file called `output.afp` enter:

```
ps2afp -o output.afp input.01.ps input.02.ps ... input.xx.ps
```

Transform a UNIX File to an MVS Data Set

To transform file `input.ps` into an existing, cataloged MVS output data set called *hlq*`.OUTPUT.AFP(`*member*`)`, where *hlq* is your user ID, enter:

```
ps2afp -o "//'hlq.OUTPUT.AFP(member)'" input.ps
```

Transform and Print a Job, Specifying Image Type and Resolution

To transform the PDF `myfile1.pdf` file into an AFP data stream in -pel resolution, as an IO1-MMR image, and send the result to the default printer with the **lp** command, enter:

```
pdf2afp -a io1-mmr -r  myfile1.pdf | lp
```

Transform and Print a Job, Specifying Image Type

To transform the PDF `myfile1.pdf` file into an AFP data stream as an IO1-MMR image, and send the result to the default printer with the **lp** command, enter:

```
pdf2afp -a io1-mmr myfile1.pdf | lp
```

Transform an MVS Data Set, Writing the Output to a UNIX File

To transform the MVS data set *hlq*.INPUT.PDF(*member*), where *hlq* is your user ID, into an output file called `output.afp` enter:

```
pdf2afp -o output.afp "//'hlq.INPUT.PDF(member)'"
```

Environment Variables

The **pdf2afp** and **ps2afp** commands use the following environment variables:

AOPCONF Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH Names the directory paths that the **pdf2afp** command and the **ps2afp** command search for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

Refer to *z/OS Infoprint Server Customization* for the format of the configuration files.

Exit Values

0 The data were transformed successfully.

>0 An error occurred.

sap2afp—Transform SAP OTF or ABAP Data to AFP Data

Format

sap2afp [**-st**] [**-o** *outputfile*] [**-p** *pagerange*] ... [**-r** *resolution*]

[*inputfile ...*]

Description

The **sap2afp** command transforms SAP R/3 Release 4.6C (as well as lower SAP R/3 releases) Output Text Format (OTF) and Advanced Business Application Programming (ABAP) data stream files:

- SAP OTF data streams are transformed into Advanced Function Presentation (AFP) Presentation Text Object Content Architecture (PTOCA) data streams.
- SAP ABAP data streams are transformed into line data streams.

This command is part of the Infoprint Server Transforms product.

If you specify multiple values of the same option, **sap2afp** uses the last value, with the exception of the **-p** option. Up to 20 values of the **-p** option accumulate.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (**-**) as the file name, **sap2afp** uses standard input. The output file name is also optional; if you do not specify one, the **sap2afp** command writes the results to standard output.

Note: The size of the transformed image and the position of SAP data on the page depend on the values that the administrator has defined.

Options

Note: You can use the **filter-options** job attribute with, for example, the **lp** command to pass any of these options except **-o** *outputfile* to the SAP to AFP transform.

-o *outputfile*

Specifies the output path and file into which the transform output (that is, AFP or line data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last specified path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with **//**. When you specify a fully qualified name, two sets of quotation marks are required, for example, `"//'hlq.PDS(MYDOC)'"` or `"//'hlq.SEQDS'"`. When you specify a partially qualified name, you only need one set of quotation marks, for example, `"//PDS(MYDOC)"` or `"//SEQDS"`.

If you specify an MVS data set, allocate and catalog the data set before you run this command. Allocate a data set that is large enough to hold the output data stream; the size of the output data stream depends on the complexity of the document. Typically, an output AFP data stream is several times as large as the input data stream. Allocate the output data set with the following characteristics:

- Record format: VBM

- Record length: 8K (8192) bytes or larger

-p *pagerange*
Specifies that the output should contain only selected pages. Up to 20 values of the **-p** option accumulate.

The **-p** option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered `i, ii, 1, 2, 3, 4`, specify `-p 6`.

Examples of values include:

`-p even` Write even pages.

`-p odd` Write odd pages.

`-p 1-10` Write the first through tenth pages.

`-p 10-` Write pages from the tenth page until the end of the job.

`-p 1 -p 3 -p 6`
Write the first, third, and sixth pages.

-r *resolution*
Specifies the resolution used to print image data in the job. Select the correct resolution for the printer on which you intend to print the job.

Values are:

240 240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)

300 300 pels per inch (for example, IBM 3112, 3116, 4019, 4028, 4029, and 4039 printers and Hewlett-Packard printers)

480 480 pels per inch

600 600 pels per inch (for example, the IBM Infoprint 60 and Infoprint 4000 printers)

The default resolution is the resolution defined by the administrator. If the resolution has not been set, the transform fails with error message AOP2009E.

Note: If you specify a resolution that the printer does not support, PSF prints the image data under most conditions, but with degraded results.

-s Suppresses Graphic Object Content Architecture (GOCA) boxes. Some older printers do not print these boxes.

-t Requests a trace. Specify this option only if instructed by service personnel. Refer to *z/OS Infoprint Server Messages and Diagnosis* for information about this option.

Operand

inputfile
Specifies an input file to be transformed. If you specify more than one input file name, the **sap2afp** command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

If you do not specify an input file, or if you specify a dash (**-**) as the file name, **sap2afp** uses standard input.

Customization

You can customize the **sap2afp** transform by modifying the following configuration files:

barcode.tab
Maps SAP OTF bar code names to the bar codes in Bar Code Object Content Architecture (BCOCA).

defcp.tab
Maps the Open Systems EBCDIC 1047 code page to the code page associated with the ABAP coded fonts specified in **pagedef.tab**.

fonts.tab
Maps the fonts used in the OTF data stream to AFP fonts.

image.tab
Defines values used to print image data.

pagedef.tab
Specifies the page definition, form definition, ABAP coded fonts, and the value of the OTF print option **PJPAPER**.

*xxxx***0000.tab**
Maps a SAP code page to an AFP code page.

See your administrator for help with any file that you need to change. Note that even if you change only one configuration file, you must perform these steps in order for **sap2afp** to find the configuration files:

- Copy all the configuration files into the same directory.
- Change the **AOP_SAP2AFP_RESOURCES** environment variable to point to that directory.

Limitations

The SAP to AFP transform produces monochrome output.

Examples

Transform a Job, Specifying Resolution

To transform the SAP ABAP file `myfile.abap` for printing on a 600-pel AFP printer, and write the result to a file called `myfile.afp`, enter:

```
sap2afp -r 600 -o myfile.afp myfile.abap
```

Transform and Print a Job

To transform the SAP OTF file `myfile.otf` into an AFP data stream, and send the result to the default printer with the **lp** command, enter:

```
sap2afp myfile.otf | lp
```

Transform a Job Using Redirection

To transform the SAP file `input.sap` into the AFP output file called `output.afp` enter:

```
sap2afp <input.sap> output.afp
```

Note: You can use redirection operators only with UNIX files.

Transform Multiple Files and Concatenate the Output

To transform the SAP files `input.01.sap`, `input.02.sap`, ... `input.xx.sap` into one AFP output file called `output.afp` enter:

```
sap2afp -o output.afp input.01.sap input.02.sap ... input.xx.sap
```

Transform a UNIX File to an MVS Data Set

To transform file `input.sap` into an existing, cataloged MVS output data set called *hlq*`.OUTPUT.AFP(`*member*`)`, where *hlq* is your user ID, enter:

```
sap2afp -o "//'hlq.OUTPUT.AFP(member)'" input.sap
```

Transform an MVS Data Set, Writing the Output to a UNIX File

To transform the MVS data set *hlq*`.INPUT.SAP(`*member*`)`, where *hlq* is your user ID, into an output file called `output.afp` enter:

```
sap2afp -o output.afp "//'hlq.INPUT.SAP(member)'"
```

Environment Variables

The **sap2afp** command uses the following environment variables:

AOP_SAP2AFP_RESOURCES
: Specifies the directory that contains resources for the **sap2afp** transform. The default value is **/usr/lpp/Printsrv/sap2afp**.

AOPCONF
: Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**. For more information about the configuration file, refer to *z/OS Infoprint Server Customization*.

NLSPATH
: Names the directory paths that the **sap2afp** command searches for message catalogs.

For information about setting and using environment variables, refer to *z/OS UNIX System Services User's Guide*.

Files

$HOME/.aopconf
: Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf
: Contains the system default Infoprint Server configuration file.

barcode.tab, defcp.tab, fonts.tab, image.tab, pagedef.tab, *xxxx***0000.tab**
: Customization files for the **sap2afp** transform.

Exit Values

0 The data were transformed successfully.

>0 An error occurred.

Chapter 3. Using Job Attributes

A job is a set of one or more documents that you submit to Infoprint Server for printing in a single printing session. A document is either a file or a group of similar files.

Infoprint Server uses *attributes* to describe jobs and the documents in jobs. For example, you can specify the number of copies of a document to print by setting a value for the **copies** attribute.

You can specify job attributes in different ways, depending on the method you use to submit a print job. Table 2 shows how to specify job attributes for different job submission methods and refers you to the section that contains more information.

Table 2. How to Specify Job Attributes

Job Submission Method	How To Specify Job Attributes	See Page:
z/OS UNIX **lp** command	**-o** option	51
z/OS UNIX **afp2pcl**, **afp2pdf**, and **afp2ps** commands	**-j** option	28, 35, 42 157
Print Interface subsystem	SUBSYS parameter on the DD JCL statement	137
AOPPRINT JCL procedure	OPTIONS parameter on the EXEC JCL statement	152
Infoprint Port Monitor for Windows	Infoprint Port Monitor Options dialog box (select during port configuration)	170
AIX **enq** command	**-o** option	183
OS/400 LPR command	DESTOPT option	185
OS/400 remote queue defined with CRTOUTQ	Destination options field	185

Attributes are only one of the factors that determine how your job is printed. The following values also affect your job:

- Print command options. For example, you can use the **-n** option of the **lp** command to specify the number of copies of a job.
- Values in the data stream. For example, the document can specify an overlay.
- Values in the page definition used to print the job. For example, the page definition can specify fonts.
- Values in the form definition used to print the job. For example, the form definition can specify duplex printing.
- Printer specifications. Infoprint Server allows the administrator to specify printer characteristics for each printer.
  - The administrator can limit the jobs that a printer can accept. For example, if the administrator specifies that a certain printer can print at most 5 copies of a job, and you submit a job with a value of `10` for the **copies** job attribute, your job will not be accepted.
  - The administrator can specify default values for jobs that are printed on a printer. For example, the administrator can specify the form definition that the printer uses to print jobs that are submitted without a value for the **form-definition** attribute.

- Printer setup. The way a printer is set up can affect printing. For example, if duplexing is not specified in the PCL or PostScript data stream, the printer setup determines whether or not documents print on one or both sides of the paper.

Abbreviations

This publication shows attribute names and values in their complete form. Often, you can abbreviate attribute names and values by using the first letter of each word in the name or value. For example, you can use the abbreviation **c-c-t** for the **carriage-control-type** attribute. You can use **m** for the **machine** value, and specify the attribute and value pair as **c-c-t=m**.

Sometimes specifying only the first letter in each word is ambiguous. For example, **o-b** might stand for either **output-bin** or **overlay-back**. Here, specify enough of the name so that it is unique, as in **o-bi** and **o-ba**. If the values are ambiguous, Infoprint Server rejects the command and issues an error message.

Attributes Files

You can predefine attribute and value pairs in permanent files. You can use the permanent attribute files when you need those attribute values with the **lp**, **afp2pcl**, **afp2pdf**, and **afp2ps** commands. You can also use the permanent attribute files when you need to specify those values with the AOPPRINT JCL procedure and when you use the Print Interface subsystem.

Creating an Attributes File

- You can list any job attribute in an attributes file.
- You can also list the attribute **attributes**. Thus, an attributes file can call other attributes files.

  Note: If an attributes file calls itself, the command issues an error message.
- Attributes files must not contain any attributes without values.
- When creating an attributes file, consider spelling out the complete attribute names and attribute values rather than using abbreviations.
- You can use spaces between the attribute name and the equals sign to align the equals sign and values. This makes your files easier to read and maintain.
- You can use comment lines in attributes files. The comment starts with a number sign, # , and ends at the end of line.

  Example: You could create an attributes file called **myatts** to request 5 copies of a job, simple duplex printing, and a specific output bin. Your file contains these lines:

```
# These are my job attributes
copies     = 5
duplex     = yes
output-bin = collator # Collate the job
```

  Note: You can include a number sign, # , as part of an attribute value if you precede it immediately with a backslash, \# .

Using an Attributes File

Use the **-o** flag to read an attributes file into the **lp** command. Use the **-j** flag to read at attributes file into the **afp2pcl**, **afp2pdf**, and **afp2ps** commands.

For example, to print a file called `myfile`, using the attributes in the `myatts` file, enter:

```
lp -o "attributes=myatts" myfile
```

This command is equivalent to the following command:

```
lp -o "copies=5 duplex=yes output-bin=collator" myfile
```

For information about how to specify an attributes file with the AOPPRINT JCL procedure, see Chapter 5, “Printing Using the AOPPRINT JCL Procedure” on page 151.

For information about how to specify an attributes file with the Print Interface subsystem, see “JCL Parameters for the Print Interface Subsystem” on page 137.

Job Attributes and JCL Parameters

If you have previous experience with z/OS, you are accustomed to using the OUTPUT and DD statements of the Job Control Language (JCL) to specify processing options for print jobs. Many job attributes correspond to parameters of the OUTPUT JCL statement. A few correspond to parameters of the DD and JOB JCL statements. For a list of JCL parameters with corresponding job attributes, see Appendix B, “JCL Parameters and Corresponding Job Attributes” on page 191.

Attribute Listing

This section lists job attributes in alphabetical order.

address-text

This **multi-valued** attribute specifies one to four lines of address information that can be printed in the address field of a separator sheet.

Allowed Values

You can specify one to four values. If you specify more than one value, separate the values by spaces and enclose the list of values in braces.

For each value, you can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "address-text={'Acme Novelties, Inc.' '13 Division St.'
   'Foxboro, MA 02035' USA}"
```

If any string contains double quotation marks, enclose the string in single quotation marks.

Default Value

The default text that the administrator has defined for the printer.

Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer’s separator sheet.
- The **address-text** attribute is equivalent to the ADDRESS parameter of the OUTPUT JCL statement.

building-text

This **single-valued** attribute specifies building information that can be printed in the building field of a separator sheet.

Allowed Values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "building-text='Building 7: third floor'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default Value

The default text that the administrator has defined for the printer.

Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the BUILDING parameter of the OUTPUT JCL statement.

carriage-control-type

This **single-valued** attribute identifies the type of carriage control characters that the printer device uses when interpreting and printing this document.

Allowed Values

You can enter one of these fixed values:

ansi
machine
none

Default Value

- For MVS data sets, such as partitioned data sets and sequential data sets, Infoprint Server determines the carriage control type from the record format in the data set control block (DCB).
- For UNIX files, such as HFS files, the default is **none**.

Usage Guidelines

- This attribute is most useful for line data documents.
- Use this attribute when you print UNIX files (files in a hierarchical file system) that contain carriage controls.
- For MVS data sets, Infoprint Server determines the carriage control type from the data set. When processing MO:DCA-P (including mixed mode) UNIX files, Infoprint Server usually determines the correct carriage control type. Infoprint Server might be able to properly detect UNIX files that contain line data with machine carriage controls, but for other types of line data in UNIX files, you probably need to specify **document-format = line**, and if the carriage control type is ansi, **carriage-control-type = ansi**. For other formats printed from a UNIX file, the default is correct.

chars

This **multi-valued** attribute identifies from one to four coded fonts that are used to print a line data document or a MO:DCA document in which no fonts are specified.

A coded font is a pair of a character set and a code page. Coded font names begin with a two-character prefix (X0 or XZ), followed by up to four alphanumeric characters. `X042B2` is an example of a coded font name. For more information about coded fonts, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*.

Allowed Values

You can enter a text string that contains the names of the coded fonts. The name of each font can be one to four characters long.

Note: Some coded fonts have six-character names, not counting the prefix. For these coded fonts, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for the four-character alternate coded font name.

Omit the two-character prefix from the coded font name or the alternate coded font name.

If you specify more than one coded font, separate the font names by spaces and surround the string of font names with braces, for example:

```
-o "chars={GT10 GT12}"
```

Default Values

1. The default coded fonts that the administrator has defined for the printer.
2. The coded fonts that the page definition used to print the job specifies.

Usage Guidelines

- This attribute is most useful for line data documents.
- This attribute applies to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- PSF for OS/390 uses this attribute only if the page definition used to print the job does not specify fonts, or if the default page definition is used.
- The AFP to PCL, AFP to PDF, and AFP to PostScript transforms use this attribute only if the page definition used to print the job does not specify fonts.
- If you specify more than one coded font with the **chars** attribute, the job must contain either shift-out-shift-in (SOSI) codes or table reference characters (TRCs) in order to use coded fonts other than the first one. IBM recommends that you do not mix SOSI codes and TRCs.
  - If the job contains TRCs, you must specify the **table-reference-characters** attribute value as **true**. PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use the TRC characters to select the corresponding coded font specified with the **chars** attribute.
  - If the job contains SOSI codes, PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use the first coded font specified with the **chars** attribute as the single-byte font and the second coded font as the double-byte font.

  Refer to *AFP: Programming Guide and Line Data Reference* and *PSF for OS/390 & z/OS: User's Guide* for more information about using multiple coded fonts.
- Raster fonts are used unless the administrator has requested font mapping to outline fonts and your font name is in the font mapping table.
- This attribute is equivalent to the CHARS parameter of the OUTPUT and DD JCL statements.

copies

This **single-valued** attribute specifies the number of copies of each document in the job to print.

Allowed Values

You can enter an integer from 1 to 32640.

Default Value

1. The default value that the administrator has defined for the printer.
2. **1**

Usage Guidelines

- Only one copy prints when you print to VTAM-controlled printers or to Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute.
- Only one copy of the file is sent to an e-mail destination.
- The administrator can limit the number of copies that you can specify. Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value you specify for this attribute overrides any value in the form definition that is used to print the job.
- This attribute is similar to the COPIES parameter of the OUTPUT and DD JCL statements.

department-text

This **single-valued** attribute specifies department information that can be printed in the department field of a separator sheet.

Allowed Values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "department-text='Customer Relations'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default Value

The default text that the administrator has defined for the printer.

Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the DEPT parameter of the OUTPUT JCL statement.

document-codepage

This **single-valued** attribute is the name of the code page used to create the document. Infoprint Server uses this name as the source when it uses the z/OS UNIX **iconv** program to convert data from one code page to another.

Allowed Values

You can enter the name of a code page. Refer to *z/OS C/C++ Programming Guide* for the names of code pages that **iconv** supports.

Default Value

1. The default code page that the administrator has defined for the printer.
2. The code page for the current locale of z/OS UNIX System Services. This is usually an EBCDIC code page.

Usage Guidelines

- To print an American Standard Code for Information Interchange (ASCII) job, you must use an ASCII code page. If the printer is not defined to use an ASCII code page, you must specify one as the value of this attribute. ISO8859-1 is an example of an ASCII code page.
- Infoprint Server uses this attribute to translate documents before placing them on the Job Entry Subsystem (JES) spool. Because Infoprint Server does not translate data streams such as MO:DCA-P, PCL, or PostScript, it ignores this attribute when printing these data streams.

document-format

This **single-valued** attribute identifies the format (data type) of this document.

Allowed Values

You can enter one of these fixed values:

line-data
: A data format whose bytes map to characters. Line data is stored as records, for example, in sequential data sets. The records can contain carriage-control characters and table-reference characters. Line data is typically found in mainframe data sets.

text
: A data format whose bytes map to characters. Text data contains no control characters other than line feed (LF), carriage return (CR), horizontal tab (HT), vertical tab (VT), and form feed (FF). Text data is typically found in workstation files.

modca-p
: Mixed Object Document Content Architecture Presentation (MO:DCA-P) data format, defined by IBM.

pcl
: Printer Control Language (PCL) data format, defined by Hewlett-Packard.

pdf
: Portable Document Format (PDF) data format, defined by Adobe.

postscript
: PostScript data format, defined by Adobe.

sap
: SAP Output Text Format (OTF) or SAP Advanced Business Application Programming (ABAP) Version 1 or Version 2 data format, defined by SAP AG.

other
: Any other data format.

Default Value

The value that Infoprint Server determines from the contents of the data stream.

Usage Guidelines

Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.

document-type

This **single-valued** attribute indicates that the document is either a printable document or a list of printable documents.

Allowed Values
You can enter one of these fixed values:

- **file-reference**
- **printable**

Default Value
printable

Usage Guidelines
- A printable document contains data that you want to print.
- A file-reference document is a list of similar printable documents. Separate the document names with spaces, tabs, or new lines, for example:

  ```
  file1.txt
  file2.txt
  file3.txt
  ```

  All these documents must have the same format, because Infoprint Server processes them all the same way.
- Do not combine file-reference documents and printable documents in the same job.
- Do not specify this job attribute in the SUBSYS JCL parameter.

duplex

This **single-valued** attribute indicates whether to print on one or both sides of the paper and the relative orientation of consecutive pages.

Allowed Values
You can enter one of these fixed values:

no The job is printed on one side of the paper.

yes The job is printed on both sides of the paper so that the top of side 1 is the top of side 2 (for side binding).

tumble
The job is printed on both sides of the paper so that the top of side 1 is the bottom of side 2 (for top binding).

Default Value
1. The default value that the administrator has defined for the printer.
2. The value in the form definition used to print the job.

Usage Guidelines
- This attribute applies only to documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- The value you specify for this attribute overrides any value in the form definition used to print the job.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is equivalent to the DUPLEX parameter of the OUTPUT JCL statement.

filter-options

This **single-valued** attribute lets you pass options to a filter that converts this document from one data format to another. For example, you can pass options to the following filters:

- A transform filter provided by Infoprint Server Transforms
- The Infoprint Server LPD compatibility filter (**lpd_compat.so**)
- The Infoprint Server remote transform filter (**aoprform.dll**)
- A filter written by your installation

Allowed Values

You can enter a text string that contains the options. If the string contains blanks, enclose the string in single or double quotes, for example:

```
-o "filter-options='-p 5-12 -p 21-30'"
```

For information about which options the transform filters accept, see the description of the **pcl2afp**, **pdf2afp**, **ps2afp**, **sap2afp**, **afp2pcl**, **afp2ps**, and **afp2pdf** commands in Chapter 2, “Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 23.

For information about which options the remote transform filter (**aoprform.dll**) accepts, refer to *z/OS Infoprint Server Operation and Administration*.

The LPD compatibility filter (**lpd_compat.so**) lets you specify options that correspond to parameters you can specify on the z/OS Communications Server (TCP/IP) LPR command. It accepts the following options:

-f *filter* Specifies the type of filter processing. This option corresponds to the FILTER parameter of the TCP/IP LPR command. The default value is **f**. Valid values are:

Filter	Meaning
f	Paginate the data, but do not add a heading. Truncate lines that exceed the maximum width. Discard any ASCII control characters except CR, FF, LF, BS, NL, VT, and HT.
l	Do not paginate the data or add a heading. Pass through all control characters.
p	Paginate the data, adding a heading to each page. The heading includes the date and time that Infoprint Server received the data, the title, and the page number. After a page of text, a new page is started with a new page number. Truncate lines that exceed the maximum width.
r	Interpret the first column of each input line as an ANSI (FORTRAN) carriage control. The ANSI standard limits this to blank, ″1″, ″0″, ″+″, and ″-″ carriage controls. Truncate lines that exceed the maximum width

-l *length*
Specifies the maximum number of lines to include on a page. This value applies only to filters **f** and **p**. This option corresponds to the LINECOUNT parameter of the TCP/IP LPR command. The default value is 60 lines. To prevent Infoprint Server from inserting page breaks, specify 0.

-w *width*
Specifies the maximum number of columns to allow on a line. Lines longer than the number specified (except for the title line) are truncated. The

number specified does not include the carriage control character at the beginning of each line. This value applies only to filters **f**, **p**, and **r**. This option corresponds to the WIDTH parameter of the TCP/IP LPR command. The default action is that lines are not truncated.

For examples that show how to specify this attribute on the **lp** command, see "Transform and Print a job" on page 55 and "Paginate Line Data and Print with a Header on Each Page" on page 57.

Default Value
The default filter options that the administrator has defined for the printer. If the administrator has not defined a filter option, then the default value for the option is used.

Usage Guidelines
- The filter options you specify in this attribute take effect only if the administrator specifies the filter for the printer in the Printer Inventory. The administrator can also specify filter options in the Printer Inventory.
- The administrator can control whether or not the filter options that you specify with this attribute are used. For information about how the administrator can control whether or not your filter options take effect, refer to the description of the **%filter-options** option in *z/OS Infoprint Server Operation and Administration*.
- The LPD compatibility filter can be used for text and line data when printing to an AFP printer or a JES line printer. See *z/OS Infoprint Server Operation and Administration* for more information about this filter.

form-definition

This **single-valued** attribute identifies the form definition used when printing this document.

Allowed Values
You can enter a text string of up to eight characters that contains the identification for this resource. You can specify the form definition name either with or without the **F1** prefix.

Default Value
The default form definition that the administrator has defined for the printer.

Usage Guidelines
- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If the document has an inline form definition, specify either the name of that form definition or **dummy**.
- You can instruct the AFP to PCL, AFP to PDF, and AFP to PostScript transforms to select a form definition from your user library rather than from a system library assigned to the transforms. To use a form definition from a user library, do the following:
  - Reference the user library containing the form definition in the **resource-library** attribute.
  - Specify the name of the form definition in the **form-definition** attribute.
- This attribute is equivalent to the FORMDEF parameter of the OUTPUT JCL statement.

forms

This **single-valued** attribute identifies the form (medium) on which this job is printed.

Allowed Values
You can enter a text string of up to eight characters.

Default Value
1. The default form that the administrator has defined for the printer.
2. The default form that the administrator has defined for the installation.

Usage Guidelines
- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is equivalent to the FORMS parameter of the OUTPUT JCL statement.

hold

This **single-valued** attribute indicates whether Infoprint Server holds all data sets in the job on the JES spool.

Allowed Values
You can enter one of these fixed values or synonyms:

Fixed Value	Input Synonym
true	**yes**
false	**no**

Default Value
1. The default value that the administrator has defined for the printer.
2. **false**

Usage Guidelines
- A held job remains in the queue until the z/OS operator releases it.

input-tray

This **single-valued** attribute identifies an input tray on the printer device that contains the medium used for normal document pages.

Allowed Values
You can enter any value that the administrator has defined. Some typical values are the following:

alternate
bottom
envelope
large-capacity
main
manual
middle
side
top

Default Value

1. The default input tray that the administrator has defined for the printer.
2. The input tray that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or automatically transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute does not apply to data transformed to another format using the **afp2pcl**, **afp2pdf**, or **afp2ps** command.
- When you use this attribute with the **lp** command and data is being transformed from AFP format, the value on this attribute is mapped to an input-tray-number value. For example, **letter** might be mapped to **input-tray-number=2**.

  The input-tray-number is then mapped to the appropriate printer tray. For example, **2** might be mapped to **PCL input tray 4**. In this example, if you specify **letter** on this attribute and the AFP file is being transformed automatically to PCL, the PCL printer will use input tray 4.

  See “Usage Guidelines” for the default input-tray-number mapping. Your system programmer defines the mapping from input-tray to input-tray-number in the printer definition.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value you specify for this attribute overrides any input tray selection in the data stream or form definition.
- If the tray name contains blanks or special characters, enclose the name in single or double quotes.
- This attribute is similar to the INTRAY parameter of the OUTPUT JCL statement.

input-tray-number

This **single-valued** attribute identifies an input tray number on the printer device that contains the medium used for normal document pages.

Allowed Values

You can enter any number that the AFP printer supports. Some typical values are the following:

1–255

Default Value

1. The default input tray that the administrator has defined for the printer.
2. The input tray that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- The value you specify for this attribute overrides any input tray selection in the data stream or form definition.
- This attribute is equivalent to the INTRAY parameter of the OUTPUT JCL statement.
- The following guidelines only apply to the AFP to PCL, AFP to PDF, and AFP to PostScript transforms.

- Your administrator sets up the mapping of AFP printer tray numbers to PCL, PDF, or PostScript printer tray numbers. All values greater than 9 map to the same PCL, PDF, or PostScript printer tray number. By default, this is tray 2 for PCL and PostScript output, tray 1 for PDF output.
- For PDF output, the page size for the entire document is the size of paper the administrator specifies for the selected printer tray.
- Always specify the AFP printer input bin number, not the PCL, PDF, or PostScript bin number, on this attribute. When you print to a PCL, PDF, or PostScript printer, the transforms use the tray number of the AFP printer to select a corresponding input tray number for the PCL or PostScript printer. The default mapping is shown in Table 3. For example, if you want to print from input tray 4 on a PCL printer, specify `input-tray-number=2`. Contact your administrator to confirm this mapping is valid for the transform you are using.

Table 3. input-bin-number Default Mapping

Data Stream	Mapping
PCL	1,4,0,0,0,0,0,0,0,2
PostScript	1,2,0,0,0,0,0,0,0,2
PDF	1,1,1,1,1,1,1,1,1,1

Note: ″0″ indicates that the paper tray is not installed.

jes-priority

This **single-valued** attribute indicates the scheduling priority for the job.

Allowed Values
You can enter an integer from 0 to 255.

Default Value
The default value that the administrator has defined for the printer.

Usage Guidelines
- 255 is the highest priority; 0 is the lowest.
- If the z/OS system is not configured to honor priority values, it ignores this attribute.
- This attribute is equivalent to the PRTY parameter of the OUTPUT JCL statement.

name-text

This **single-valued** attribute specifies name information that can be printed in the name field of a separator sheet.

Allowed Values
You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "name-text='C. J. Brown'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default Value
The default text that the administrator has defined for the printer.

Usage Guidelines

- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the NAME parameter of the OUTPUT JCL statement.

output-bin

This **single-valued** attribute specifies the name of the output bin to which you want Infoprint Server to direct the output from your job.

Allowed Values

You can enter any value that the administrator has defined. Some typical values are the following:

bottom
collator
face-down
face-up
large
left
middle
private
right
side
top

Default Value

1. The default output bin that the administrator has defined for the printer.
2. The output bin that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or automatically transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute does not apply to data transformed to another format using the command **afp2pcl**, **afp2pdf**, or **afp2ps**.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- The value you specify for the **output-bin** attribute overrides any output bin that the form definition used to print the job specifies.
- If the bin name contains blanks or special characters, enclose the name in single or double quotes.
- This attribute is similar to the OUTBIN parameter of the OUTPUT JCL statement.

output-bin-number

This **single-valued** attribute specifies the number of the output bin to which you want Infoprint Server to direct the output from your job.

Allowed Values

You can enter any number that the AFP printer supports. Some typical values are the following:

1–16

Default Value

1. The default output bin that the administrator has defined for the printer.
2. The output bin that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- When you print to a PCL or PostScript printer, instead of to an AFP printer, specify the output bin number of the PCL or PostScript printer.
- The value you specify for the **output-bin-number** attribute overrides any output bin that the form definition used to print the job specifies.
- This attribute is equivalent to the OUTBIN parameter of the OUTPUT JCL statement.

overlay-back

This **single-valued** attribute specifies the name of an overlay that PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms place on the back of each page in a two-sided job. An overlay contains predefined data, such as lines, shading, text, boxes, or logos that can merge with variable data on a page.

Allowed Values

You can enter an overlay name of up to eight characters. The first character must be alphabetic. Note that for overlays, unlike form definitions and page definitions, you must specify the complete name, including the **O1** prefix.

Default Value

The default overlay that the administrator has defined for the printer.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This overlay prints in addition to any overlay specified by the form definition for the job.
- This attribute is equivalent to the OVERLAYB parameter of the OUTPUT JCL statement.

overlay-front

This **single-valued** attribute specifies the name of an overlay that PSF and the AFP to PCL, AFP to PDF, and AFP to PostScript transforms place on the front of each page in the job. An overlay contains predefined data, such as lines, shading, text, boxes, or logos that can merge with variable data on a page.

Allowed Values

You can enter an overlay name of up to eight characters. The first character must be alphabetic. Note that for overlays, unlike form definitions and page definitions, you must specify the complete name, including the **O1** prefix.

Default Value

The default overlay that the administrator has defined for the printer.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This overlay prints in addition to any overlay specified by the form definition for the job.
- This attribute is equivalent to the OVERLAYF parameter of the OUTPUT JCL statement.

page-definition

This **single-valued** attribute identifies the page definition used to print a line data document.

Allowed Values

You can enter a text string of up to eight characters. You can specify the page definition name either with or without the **P1** prefix.

Default Value

The default page definition that the administrator has defined for the printer.

Usage Guidelines

- This attribute applies to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If the document has an inline page definition, specify either the name of that page definition or **dummy**.
- This attribute is equivalent to the PAGEDEF parameter of the OUTPUT JCL statement.

print-error-reporting

This **single-valued** attribute indicates the type of data fidelity problems (print-positioning errors or invalid-character errors) that the printer reports while printing this document.

Allowed Values

You can enter one of these fixed values:

all	Report both print-positioning and invalid-character errors.
character	Report only invalid-character errors.
none	Report no errors.
position	Report only print-positioning errors.

Default Value

The default value that the administrator has defined for the printer.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer.
- Before accepting a job, Infoprint Server verifies that the printer can support the value of this attribute.
- This attribute is similar to the DATACK parameter of the OUTPUT JCL statement.

print-queue-name

This **single-valued** attribute specifies the name of the print queue on the target printer.

Allowed Values
You can enter a text string up to 127 characters long.

Default Value
The default print queue that the administrator has defined for the printer.

Usage Guidelines
- The value in this attribute overides the print queue name specified in the printer definition. You must use this attribute for local area network (LAN) printers not defined by your administrator.
- If the printer definition does not specify the LPR protocol, IP PrintWay ignores this parameter.
- This attribute is equivalent to the PRTQUEUE parameter of the OUTPUT JCL statement.

printer-ip-address

This **single-valued** attribute identifies the Internet Protocol (IP) address of the target printer.

Allowed Values
You can enter a text string of up to 115 characters. The string must be one of these types of address:

Dotted decimal address

A series of integers within the range of 0 to 255, separated by periods (decimal address), for example:

```
9.99.12.85
```

Host name

A series of domain names that can contain alphanumeric characters and dashes (–), separated by periods (.). The first character must be alphabetic or numeric, for example:

```
printer1.boulder.IBM.com
```

Default Value
The IP address that the administrator has defined for the printer.

Usage Guidelines
- The value in this attribute overides the IP address specified in the printer definition. Use this attribute when you submit jobs to LAN printers not defined by your administrator.
- If the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores this parameter.
- When you specify this attribute, you must also specify the **print-queue-name** attribute.
- For printers attached using the i-data 7913 Intelligent Printer Data Stream™ (IPDS™) Printer LAN Attachment, use the IP address of the 7913.
- This attribute is equivalent to the DEST=IP parameter of the OUTPUT JCL statement.

resource-library

This **multi-valued** attribute defines the location for document-specific resources: fonts, form definitions, overlays, and page definitions.

Allowed Values
You can enter up to eight names of cataloged MVS data sets. Each name can be up to 44 characters long. Separate multiple library names with spaces and surround the string of library names with braces, for example:

```
-o 'resource-library={FONT.LIBRARY OVERLAY.LIBRARY}'
```

Default Values
1. The default resource libraries that the administrator has defined for the printer.
2. PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform determine the resource libraries.

Usage Guidelines
- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform cannot find a resource, it processes the job and prints error messages at the end of the job. Infoprint Server reports the job as completed.
- All libraries used with the AFP to PCL, AFP to PDF, or AFP to PostScript transform must be defined to RACF with universal read access.
- This attribute is equivalent to the USERLIB parameter of the OUTPUT JCL statement.

room-text

This **single-valued** attribute specifies room information that can be printed in the room field of a separator sheet.

Allowed Values
You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "room-text='Room 306-B'"
```

If the string contains double quotation marks, enclose the string in single quotation marks.

Default Value
The default text that the administrator has defined for the printer.

Usage Guidelines
- Whether the text specified by this attribute is printed depends on how the administrator configures the printer's separator sheet.
- This attribute is equivalent to the ROOM parameter of the OUTPUT JCL statement.

shift-out-shift-in

This **single-valued** attribute specifies the printer scanning modes used when processing EBCDIC line data that prints with either a single-byte or a double-byte font.

Allowed Values
You can enter one of these fixed values:

one PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-out, shift-in code to a blank and a Set Coded Font Local text control.

two PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-out, shift-in code to a Set Coded Font Local text control.

three PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform converts each shift-in code to a Set Coded Font Local text control and two blanks. It converts each shift-out code to a Set Coded Font Local text control.

Default Value
The default value that the administrator has defined for the printer.

Usage Guidelines
- This attribute applies only to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- For the shift-in, shift-out process to work correctly, either the **chars** attribute or the page definition used to print the job must specify two coded fonts. The first must be a single-byte font, and the second must be a double-byte font.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.
- This attribute is similar to the PRMODE parameter of the OUTPUT JCL statement.

sysout-dataset-name

This **single-valued** attribute specifies the name to assign to the system output data sets (called sysout data sets) that Infoprint Server creates on the JES spool. It becomes the last qualifier of the fully-qualified data set name on the JES spool. The fully-qualified data set name can be printed on a separator page created by your installation. It can also be printed on a separator page (also called a banner page) printed by the printer's LPD. If the file is sent to an e-mail destination instead of to a printer, the name you specify in this parameter is used as the name of the e-mail attachment.

Allowed Values
You can enter a text string of up to eight characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks, for example:

```
-o "sysout-dataset-name='$MYFILE'"
```

Lowercase letters are converted to uppercase letters.

Default Value
The last eight characters of the name of the file. If the first character is not a letter, #, $, or @, it is converted to a #. If one of the remaining characters is not a letter, number, #, $, or @, it is converted to a #.

Usage Guidelines
- If you use the Print Interface subsystem, the **lpstat** command displays this name.
- If you do not use the Print Interface subsystem, the **lpstat** command displays the original file name instead of this name in order to provide more information about the file.
- This attribute is similar to the DSNAME parameter of the DD JCL statement.

sysout-job-id

This **single-valued** attribute specifies the job ID to assign to the system output data sets (called sysout data sets) that Infoprint Server creates on the JES spool. The system operator can use this job ID to locate the sysout data sets on the JES spool.

Allowed Values

You can enter a text string of up to eight characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks, for example:

```
-o "sysout-job-id='#123'"
```

Lowercase letters are converted to uppercase letters.

Default Value

- If you use the Print Interface subsystem, the job ID that z/OS assigns to your job is used.
- If you do not use the Print Interface subsystem, the Infoprint Server job ID is used. The Infoprint Server job ID is a unique identifier composed of the two character prefix specified in the Infoprint Server configuration file, **aopd.conf**, followed by a unique number. You can use this number to query or cancel your job with the **lpstat** or **cancel** commands.

Usage Guidelines

- You cannot use the value you specify to query or cancel your job with the **lp** or **lpstat** command.
- The job ID you specify is not written in the SMF type 6 accounting record that either IP PrintWay or PSF writes.
- JES commands do not display this job ID. JES commands display the job ID that z/OS assigns to the job.

sysout-job-name

This **single-valued** attribute specifies the job name to assign to the system output data sets (called sysout data sets) that Infoprint Server creates on the JES spool. The system operator can use this job name to locate the sysout data sets on the JES spool. This name can be printed on a separator page created by your installation. It can also be printed on a separator page (also called a banner page) printed by the printer's LPD.

Allowed Values

You can enter a text string of up to eight characters. The first character must be a letter or a national (#, $, @) character. Other characters can be letters, numbers, or national (#, $, @) characters. If the text string contains #, $, or @, enclose the text string in single or double quotation marks, for example:

```
-o "sysout-job-name='$MYJOB'"
```

Lowercase letters are converted to uppercase letters.

Default Value

- If you use the Print Interface subsystem, the job name specified on the JOB JCL statement, or the name assigned by the z/OS system, is used.
- If you do not use the Print Interface subsystem, the first eight characters of your user ID are used.

Usage Guidelines

- Whether the job name specified by this attribute is printed depends on how your administrator configures the printer's separator sheet or how the printer's LPD is implemented.
- The job name you specify is written in the SMF type 6 accounting record that either IP PrintWay or PSF writes.
- This attribute is equivalent to the job name you can specify on a JOB JCL statement.

table-reference-characters

This **single-valued** attribute specifies whether the document contains table-reference characters (TRCs). A TRC selects a font character set named by the **chars** attribute or in the page definition used to print the job. A TRC is the first character of each line in the document unless the first character is a carriage control character. In that case, the TRC is the second character.

Allowed Values

You can enter one of these fixed values or synonyms:

Fixed Value:	Input Synonym:
true	**yes**
false	**no**

Default Value

The default value that the administrator has defined for the printer.

Usage Guidelines

- This attribute applies only to line data documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If the value of this attribute is **true** and the page definition does not identify fonts, you must specify fonts with the **chars** attribute.
- If the line data contains TRCs and you do not specify this attribute, your printed output will not be correct. PSF or the AFP to PCL, AFP to PDF, or AFP to PostScript transform interprets the TRCs as text characters instead of font identifiers.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.
- This attribute is equivalent to the TRC parameter of the OUTPUT JCL statement.
- For more information about using table-reference characters, refer to *AFP: Programming Guide and Line Data Reference*.

title-text

This **single-valued** attribute describes the contents of the file. This value can be printed on a separator page created by your installation. It can also be printed on a separator page (also called a banner page) printed by the printer's LPD. If the file is sent to an e-mail destination, this value is the subject of the e-mail.

Allowed Values

You can enter a text string of up to 60 characters. If the text string you specify contains spaces, enclose the text string in single or double quotation marks, for example:

```
-o "title-text='Meeting Agenda'"
```

If the string contains double quotation marks, enclose the string in single quotation marks, for example:

```
-o "title-text='A New Interpretation of "Finnegans Wake"'"
```

Default Value

- For a separator page created by an IP PrintWay or PSF exit: The default value is the title your administrator specified in the Allocation section of the printer definition. If none is specified, there is no default value.
- For the LPD's separator page: The default value is the title your administrator specified in the Allocation section of the printer definition. If none is specified, the default value is the title or filename your administrator specified in the Protocol section of the printer definition. If none is specified, the default value is the data set name.
- For the subject of an e-mail: The default value is the title specified in the Allocation section of the printer definition. If none is specified, the default value is the job name. Depending on how the print request was submitted, the job name might be the ID of the user who submitted the print request.

Usage Guidelines

- Whether the text specified by this attribute is printed depends on how your administrator configures the printer's separator sheet or how the LPD is implemented.
- This attribute is equivalent to the TITLE parameter of the OUTPUT JCL statement.

x-image-shift-back

This **single-valued** attribute specifies the X offset of the logical page origin to the right of the physical page origin on the back side of a double-sided sheet.

Allowed Values

You can enter a number from 000.000 to 999.999, optionally followed by the unit of measure. The default unit of measure is millimeters. No blank spaces are allowed. The following units are valid:

Unit	Meaning
IN	Inches
CM	Centimeters
MM	Millimeters (default unit)
PELS	Picture elements (1/240 inch)
POINTS	Points (1/72 inch)

For example, you can enter the following values:

```
x-image-shift-back=25.4
x-image-shift-back=25.4MM
x-image-shift-back=2.54CM
x-image-shift-back=1IN
x-image-shift-back=240PELS
x-image-shift-back=72POINTS
```

Default Value

1. The default X offset that the administrator has defined for the printer.
2. The X offset that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the X-offset value in the form definition used to print the job.
- This attribute is similar to the OFFSETXB parameter of the OUTPUT JCL statement.

x-image-shift-front

This **single-valued** attribute specifies the X offset of the logical page origin to the right of the physical page origin on the front of the sheet.

Allowed Values

You can enter a value from 0 through 999.999, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See "x-image-shift-back" on page 104 for information about the allowed values.

Default Value

1. The default X offset that the administrator has defined for the printer.
2. The X offset that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the X-offset value in the form definition used to print the job.
- This attribute is similar to the OFFSETXF parameter of the OUTPUT JCL statement.

y-image-shift-back

This **single-valued** attribute specifies the Y offset of the logical page origin below the physical page origin on the back side of a double-sided sheet.

Allowed Values

You can enter a value from 0 through 999.999, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See "x-image-shift-back" on page 104 for information about the allowed values.

Default Value

1. The default Y offset that the administrator has defined for the printer.
2. The Y offset that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the Y-offset value in the form definition used to print the job.
- This attribute is similar to the OFFSETYB parameter of the OUTPUT JCL statement.

y-image-shift-front

This **single-valued** attribute specifies the Y offset of the logical page origin below the physical page origin on the front of the sheet.

Allowed Values

You can enter a value from 0 through 999.999, optionally followed by the unit of measure. The default unit of measure is millimeters. No blanks are allowed. See “x-image-shift-back” on page 104 for information about the allowed values.

Default Value

1. The default Y offset that the administrator has defined for the printer.
2. The Y offset that the form definition used to print the job specifies.

Usage Guidelines

- This attribute applies to line data and AFP documents printed on an IBM AFP printer or transformed to another format using the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- This attribute overrides the Y-offset value in the form definition used to print the job.
- This attribute is similar to the OFFSETYF parameter of the OUTPUT JCL statement.

Chapter 4. Printing from Batch Applications Using DD and OUTPUT JCL Statements

This chapter describes how to code the OUTPUT and DD statements of the Job Control Language (JCL) in order to use Infoprint Server to process an output data set. It describes how to:

- Print output data sets using the IP PrintWay component of Infoprint Server. IP PrintWay can transmit an output data set to a printer or print server in your TCP/IP network or to a VTAM-controlled printer. IP PrintWay can also send an output data set to an e-mail destination.
- Transform data from one data format to another format and print it on any printer.

Printing Output Using IP PrintWay

To use IP PrintWay to print an output data set, you must specify the Job Entry Subsystem (JES) work-selection criteria that your administrator has defined for the IP PrintWay output writer (also known as the IP PrintWay FSA). JES work-selection criteria can be a JES output class, a writer name, and so on. For example, if your administrator has defined the IP PrintWay FSA to select output data sets from the JES spool in JES output class P, you would specify class P on your OUTPUT or DD statement. Ask your administrator for the appropriate work-selection values to specify.

If you use the Print Interface subsystem, and your administrator has specified the JES work-selection criteria in the printer definition in the Printer Inventory, you do *not* need to specify the JES work-selection criteria in the JCL. For example, if your administrator has specified class P as the JES output class in the printer definition, you do not need to specify class P on your OUTPUT statement.

To direct your output to a particular printer or e-mail destination, you can use one of the following methods. Each of these methods is described in more detail in the following sections:

- Specify the name of the printer definition your administrator defined in the Printer Inventory.
- Specify the output class, destination name, or form name that your administrator assigned to the printer definition in the Printer Inventory.
- Specify the printer's Internet Protocol (IP) address and either print queue name or port number.

Specifying the Printer Definition Name

You can specify the printer definition name in the FSSDATA='printer' parameter on the OUTPUT JCL statement. If you use the Print Interface subsystem, you can instead specify the printer definition name in the SUBSYS parameter on the DD JCL statement. The printer definition name is case-sensitive and must exactly match the name of the printer definition created by your administrator in the Infoprint Server Printer Inventory.

Typically, IP PrintWay uses the IP address in the named printer definition to locate the printer. However, if you also specify an IP address in the DEST=IP parameter of the OUTPUT JCL statement, IP PrintWay uses that address to locate the printer

instead of the address in the printer definition. You might want to specify the printer's IP address in the DEST=IP parameter when your administrator has not created a printer definition for your printer.

Related information: See "Direct Output to IP PrintWay and to a Printer By Specifying the Printer Definition Name" on page 142 for an example.

Specifying Class, Destination, or Form

If you do not know the printer definition name, you can specify a value for at least one of the CLASS, DEST, and FORMS parameters on the OUTPUT JCL statement. You can specify any or all of these values. IP PrintWay sends the print data set to a printer or e-mail destination whose printer definition matches the values that you specify. Ask your administrator to determine the values that you can specify.

Related administrative task: The administrator must specify the CLASS, DEST, and FORMS values in the printer definition and select the **Use DEST, CLASS, and FORMS for IP PrintWay printer selection** option in the printer definition.

Limitation: If you use the Print Interface subsystem, you *cannot* use the CLASS, DEST, and FORMS JCL parameters to select the printer definition. Instead, you must specify the name of the printer definition.

Related information: See "Direct Output to IP PrintWay and to a Printer by Specifying DEST, CLASS, or FORMS" on page 143 for an example.

Specifying the Printer's IP Address

To print a data set on a printer for which your administrator has not created a printer definition, specify the DEST=IP parameter on the OUTPUT JCL statement. Specify the IP address or host name of the printer or the system to which the printer is attached. When you specify DEST=IP, you must also specify either the PRTQUEUE parameter or the PORTNO parameter on the OUTPUT JCL statement.

If you also specify the name of a printer definition in either the FSSDATA or SUBSYS parameter, IP PrintWay uses printing options specified in that printer definition, but uses the printer's IP address specified in the DEST=IP parameter. If you do not specify the name of a printer definition, IP PrintWay uses printing options specified in the IP PrintWay default printer definition.

Limitation: If the resubmit for filtering function is used, do *not* code the DEST=IP, PRTQUEUE, and PORTNO parameters on the OUTPUT JCL statement because IP PrintWay ignores these parameters and instead uses the IP address, print queue name, and port number in the printer definition.

Related information: See "Direct Output to IP PrintWay and to a Printer By Specifying a Host Name or an IP Address" on page 143 for an example.

Sending Output to an E-mail Destination

When you submit a print request, you can send the file to an e-mail destination instead of to a printer. When you send a file to an e-mail destination, your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail.

The e-mail has the following characteristics:

- Each output data set is a separate e-mail attachment. The name of the attachment is the value specified in the DSNAME parameter on the DD statement for the output data set. If none is specified, the job name is used.

  In a JES2 environment, if your job creates multiple output data sets that JES2 places in the same output subgroup, IP PrintWay can send the output data sets as attachments in the *same* e-mail. To obtain this function, your administrator must select the **Concatenate job** option in the **Dataset grouping** field in the printer definition.

  For more information about when JES groups data sets in the same output subgroup, refer to *z/OS JES2 Initialization and Tuning Guide*.

  Limitation: JES2 output grouping is *not* supported when either the resubmit for filtering function or the Print Interface subsystem is used. In these situations, each output data set is sent in a separate e-mail attachment.
- The subject of the e-mail is the value specified in the TITLE parameter on the OUTPUT JCL statement. If the TITLE parameter is not specified, the subject is either the title value your administrator specified in the Allocation section of the printer definition or the job name. The title in the printer definition is used only if either the resubmit for filtering function or Print Interface subsystem is used.
- The sender is the user ID of the user who ran the job.
- You can receive replies from an e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. Use the z/OS UNIX **mail** or **mailx** command to view your mail. To use these commands, your ID must be a valid z/OS UNIX user ID. For more information about these commands, refer to *z/OS UNIX System Services Command Reference*.

The following table shows the tasks related to sending output to an e-mail destination. Required tasks are required by all installations. Optional tasks are required only if the listed condition applies.

Task	Condition	See Page:
Modifying JCL to Send Output to an E-mail Destination	Required	109
Specifying the E-mail Address List in an Alias File	Optional: If a z/OS UNIX sendmail alias name is specified in the printer definition	110

Modifying JCL to Send Output to an E-mail Destination

If you currently use JCL to print output using IP PrintWay, in most cases you need to make only minimal changes to the JCL. You might need to modify these JCL parameters:

- Specify the name of the printer definition for the e-mail destination in the FSSDATA parameter on the OUTPUT statement, or specify the DEST, CLASS, and FORMS parameters that your administrator associated with the printer definition.
- If you currently specify the IP address of the printer in the DEST=IP parameter on the OUTPUT statement, remove the DEST=IP parameter. This is because the e-mail address list of the recipients, or the sendmail alias name that represents the e-mail address list, must be specified in the printer definition; you cannot currently specify the e-mail address list directly in a JCL parameter.
- Remove the RETRYL and RETRYT parameters from the OUTPUT statement, or specify values of 0, because retries are not recommended when you send output to e-mail destinations.

You can specify the following optional JCL parameters to customize your e-mails:

- TITLE parameter: Specify the subject of the e-mail in the TITLE parameter on the OUTPUT statement.
- DSNAME parameter: Specify the name of the e-mail attachment in the DSNAME parameter on the DD statement.

  For example, if you specify `DSNAME=&&REPORT`, then the attachment name is `REPORT.pdf` or `REPORT.txt`, where the file name extension (`pdf`, `txt`) identifies the data format of the e-mail attachment. IP PrintWay automatically appends the appropriate extension to the name of the attachment.

To send output data sets that contain either AFP data or line data that requires AFP resources, all AFP resources must be included inline in the data set so that the file can be viewed with the IBM AFP Viewer. If the required AFP resources are not already inline, you can use the IBM AFP Conversion and Indexing Facility (ACIF) program, a feature of PSF for OS/390, to create a file that contains the AFP resources; then you can concatenate that resource file to the data file.

Related information: See "JCL Examples" on page 142 for examples of JCL to use when you send output to an e-mail destination.

Specifying the E-mail Address List in an Alias File

Instead of specifying the e-mail address list of the recipients in the printer definition, your administrator can specify one or more alias names in the printer definition. An alias name is a name defined to z/OS UNIX sendmail that represents one or more actual e-mail addresses. For example, alias name `dept123` might represent the e-mail addresses of all employees in department 123. The alias name is specified in the printer definition; only your administrator needs to know the alias name.

The actual e-mail address list can be defined in any UNIX file. If the file is one that you can edit, the administrator does not need to change the printer definition whenever you need to change the address list. For example, your administrator can specify that the actual e-mail address list for alias `dept123` is located in file `/u/user1/dept123.list`.

Before you begin: For each address list, your administrator must perform the following tasks:

- Create a printer definition and specify a sendmail alias name in the definition.
- In the sendmail aliases file **/etc/aliases**, specify the same alias name and specify the name of a file to contain the actual e-mail address list. Ask your administrator for the name of this file so that you can create it.

Steps to create an alias file: To create an alias file, follow these steps:

1. Create a file using the name defined by your administrator. For example, create file `/u/user1/dept123.list` using your preferred editor:

   ```
   oedit /u/user1/dept123.list
   ```

2. Specify the e-mail addresses in this file:

   ```
   user1@xyz.com,user2@xyz.com,user3@xyz.com,user4@xyz.com,
   user5@xyz.com
   ```

3. Change the permissions of the file so that the file is readable by everyone but writable only by the owner:

   ```
   chmod 755 /u/user1/dept123.list
   ```

4. Change the permissions of the directory so that it is readable and executable by everyone but writable only by the owner:

```
chmod 755 /u/user1
```

For more information about the z/OS UNIX commands used in this example, refer to *z/OS UNIX System Services Command Reference*.

Transforming Output Data

The Print Interface component of Infoprint Server, together with transforms provided by Infoprint Server Transforms, can transform data created by a batch application before writing it to the JES spool. Print Interface can transform data to a format the printer accepts or to a format suitable for viewing in an e-mail attachment.

Table 4 lists the transforms that are available with Infoprint Server Transforms and refers you to the section in this publication that describes the functions and limitations of each transform.

Table 4. Data Transforms

Transform	See Page:
Line data and AFP data to Printer Control Language (PCL) format	28
Line data and AFP data to Portable Data Format (PDF)	35
Line data and AFP data to PostScript format	42
PCL data to AFP format	65
PDF data to AFP format	69
PostScript data to AFP format	69
SAP Output Text Format (OTF) data to AFP format	78
SAP Advanced Business Application Programming (ABAP) data to line data	78

Infoprint Server provides two methods that you can use to transform and print data sets created by a batch application:

- **Print Interface subsystem:** The Print Interface subsystem can transform data created by a batch application *before* the data is written to the JES spool. The subsystem writes the transformed data to an output data set on the JES spool. The output data set on the JES spool can then be printed on any printer or sent to an e-mail destination. To use the Print Interface subsystem, you specify the SUBSYS parameter on the DD JCL statement for the output data set.
- **Resubmit for filtering function:** When your administrator enables the IP PrintWay resubmit for filtering function, Print Interface can transform data created by a batch application *after* JES has written the data to an output data set on the JES spool. After Print Interface transforms the data, it writes the transformed data to a new output data set on the JES spool. IP PrintWay then prints the output data set or sends it to an e-mail destination. Because your administrator selects the resubmit for filtering function in the printer definition, in most cases no JCL changes are required to use this function.

Table 5 on page 112 compares the advantages and limitations of the Print Interface subsystem and the resubmit for filtering function.

Table 5. Comparison of Print Interface Subsystem and the Resubmit for Filtering Function

Print Submission Method	Advantages	Limitations
Print Interface subsystem	• You can use standard DD and OUTPUT JCL statements with minimal JCL changes. • You can specify Infoprint Server job attributes. • The data set can be printed on any printer or sent to an e-mail destination.	• Only one OUTPUT JCL statement for each data set is supported. • DEST, HOLD, MODIFY, SEGMENT, and SYSOUT parameters on the DD JCL statement are not supported. • JES2 output grouping is not supported.
Resubmit for filtering function	You can use standard DD and OUTPUT JCL statements with, in most cases, no JCL changes.	• The data set can be sent only to a printer or e-mail destination controlled by IP PrintWay. • Less efficient than the subsystem because data is written to the JES spool twice. • DEST=IP, PRTQUEUE, and PORTNO parameters on the OUTPUT JCL statement are not supported. • JES2 output grouping is not supported.

You can also use the following methods to transform and print existing data sets:

- **AOPPRINT JCL procedure:** The AOPPRINT JCL procedure uses Print Interface to transform data in an existing MVS data set or UNIX file and to write the transformed data to an output data set on the JES spool. The output data set on the JES spool can be printed on any printer or sent to an e-mail destination. For more information, see Chapter 5, “Printing Using the AOPPRINT JCL Procedure” on page 151.
- **Transform commands:** The z/OS UNIX transform commands, which you can run using the AOPBATCH program, transform data in existing MVS data sets or UNIX files. The transform commands write the transformed output to an MVS data set or UNIX file but do not write the data set to an output data set on the JES spool for printing. For more information, see Chapter 6, “Transforming Data With the AOPBATCH Program” on page 157.

Related administrator tasks: To transform data, your administrator must:

- Customize Infoprint Server Transforms (5697–F1) and the Infoprint Server Transform Manager. To use the AFP to PCL, AFP to PostScript, or AFP to PDF transform, the administrator must scale 240–pel fonts to 300 pels because these transforms require 300-pel fonts.
- If you want to use the Print Interface subsystem, edit the Infoprint Server configuration file so that the subsystem starts.
- Specify the appropriate transforms in the printer definitions in the Printer Inventory. If you want to use the resubmit for filtering function, the administrator must select this function in the printer definition.

Refer to *z/OS Infoprint Server Customization* and *z/OS Infoprint Server Operation and Administration* for information.

Transforming Data Using the Print Interface Subsystem

The Print Interface subsystem can transform data created by a batch application from one data format to another and then write the transformed data to an output data set on the JES spool. The output data set on the JES spool can then be

printed on any printer or sent to an e-mail destination. You might want to use the Print Interface subsystem in the following situations:

- To print PCL, PostScript, and PDF data on IBM AFP printers controlled by PSF for OS/390.
- To print line data and AFP data on PCL, PostScript, and PDF printers controlled by IP PrintWay.
- To send line data and AFP data in PDF format to e-mail destinations using the IP PrintWay e-mail function.
- To specify Infoprint Server job attributes.

To use the Print Interface subsystem, code the following JCL parameters:

- SUBSYS parameter on the DD JCL statement, with the following subparameters:
  - Name of the Print Interface subsystem. Ask your administrator for the subsystem name. The subsystem name is usually AOP1.
  - Name of a printer definition in the Infoprint Server Printer Inventory. Ask your administrator for the printer definition name.
  - Infoprint Server job attributes for special printing requirements. See Chapter 3, "Using Job Attributes" on page 83 for the job attributes you can specify.

    Most of the Infoprint Server job attributes correspond to parameters on the DD and OUTPUT JCL statements; for example, the **copies** job attribute corresponds to the COPIES JCL parameter. Therefore, in most cases, simply specify the JCL parameters with which you are familiar and do not specify job attributes.

    However, you might need to specify one of the following attributes:
    - The **filter-options** attribute, which lets you specify transform options. Your administrator can specify transform options in the printer definition; however, you might want to specify a different transform option for a specific data set.
    - The **document-format** attribute, which lets you specify the data format. This attribute is required only if you print data whose format Infoprint Server cannot detect.
    - The **document-codepage** attribute, which lets you specify a code page for the input data. This attribute is required only if you print data that uses a different code page than the document code page specified in the printer definition or the default document code page.
- If you code the DSNAME parameter on the DD JCL statement, code the format that is suitable for a sysout data set: &&*dsname*.
- Print-related parameters on the DD and OUTPUT JCL statements. Your administrator can specify default values for these JCL parameters in the printer definition; therefore, you can omit any JCL parameters that have suitable defaults. If your administrator does not provide a default value for a JCL parameter, then the standard default value applies. However, JES default values for the CHARS, UCS, PAGEDEF, and FCB parameters are not used to transform data.

Limitations: The following limitations apply when you use the Print Interface subsystem:

- You *cannot* use the DEST, CLASS, and FORMS parameters on the OUTPUT JCL statement to select the IP PrintWay printer definition.
- Do *not* code the SEGMENT and SYSOUT parameters on the DD JCL statement. If you do, you receive a JCL error.
- Do *not* code the DEST, HOLD, and MODIFY parameters on the DD JCL statement. The Print Interface subsystem ignores these parameters. You can,

however, specify the OUTDISP parameter on the OUTPUT JCL statement insted of the HOLD parameter on the DD JCL statement.

- Specify only one OUTPUT JCL statement for each DD statement. The Print Interface subsystem uses only *one* OUTPUT JCL statement, in the following order:
  1. The first OUTPUT JCL statement referred to in the OUTPUT parameter on the DD statement.
  2. The first OUTPUT JCL statement with DEFAULT=YES in the same job step.
  3. The first OUTPUT JCL statement with DEFAULT=YES in the job.
- Each output data set that the Print Interface subsystem creates on the JES spool is placed in a separate JES output subgroup from other output data sets in the same job step, regardless of the value specified in the GROUPID parameter on the OUTPUT JCL statement.
- The QSAM and BSAM access methods and the OPEN, CLOSE, and PUT functions are supported. Other access methods and functions (such as CHECKPOINT, GET, and LOCATE) are not supported.
- JES2 /*OUTPUT JCL statements and JES3 //*FORMAT JCL statements are ignored.
- If your application writes multiple output data sets that require data transforms, then your job, as well as other jobs, might not complete if your administrator limits the maximum number of data transforms. Therefore, before using the Print Interface subsystem, contact your administrator to determine whether the **maximum-active** attribute in the transform configuration file is suitable for your application.

Error Handling: When the Print Interface subsystem detects an error, it writes an error message to your job log, and it does not write any output data to the JES spool for the job step. If the subsystem detects an error during PUT and CLOSE operations in your application, it abnormally terminates with abend code 09B after writing an error message. Some situations that can cause an abnormal termination are:

- The format of the data that your application writes to the DD statement is not supported by the printer. Your administrator specifies the supported data formats in the printer definition. For information about the supported data formats, see “document-format” on page 89.
- The data transform is not installed or is not customized correctly.

Related information:

- “JCL Parameters for the Print Interface Subsystem” on page 137
- JCL Examples:
  - “Print Line or AFP Data on a PostScript Printer Using the Print Interface Subsystem” on page 149
  - “Print PostScript, PCL, or PDF Data on an IBM AFP Printer Using the Print Interface Subsystem” on page 150

Modifying JCL to Use the Print Interface Subsystem

The following examples show how to modify the JCL you might use to print a data set to the same printer.

Example 1: JCL that does *not* use the Print Interface subsystem

```
//DD1    DD SYSOUT=E,DEST=PRT003,DSNAME=&&MYDATA
```

Example 2: JCL that uses the Print Interface subsystem (changes in bold)

```
//DD1    DD SUBSYS=(AOP1,'printer003'),DSNAME=&&MYDATA
```

These examples assume that printer definition `printer003` in the Infoprint Server Printer Inventory contains the following values:

Field	Value
CLASS	E
DEST	PRT003
FORMS	not specified (JES default value is used)

The following changes were made in these JCL examples:

- In Example 2, the SYSOUT parameter on the DD JCL statement was replaced with the SUBSYS parameter. In the SUBSYS parameter, the name of the Print Interface subsystem (AOP1) and the name of the printer definition that your administrator defined for the printer (printer003) are specified.
- In Example 2, the class, destination, and forms values are not specified because the printer definition contains the same values as shown in Example 1. However, to override these values in the printer definition, you could code the CLASS, DEST, and FORMS parameters on an OUTPUT JCL statement.

Transforming Data Using the Resubmit for Filtering Function

IP PrintWay, with the resubmit for filtering function enabled, can transform data in a system output (called sysout) data set from one data format to another (if necessary) and then send it to a remote printer or to an e-mail destination. You might want to use the resubmit for filtering function in the following situations:

- To print data sets that contain line data and AFP data on remote PCL, PostScript, and PDF printers controlled by IP PrintWay.
- To send line data and AFP data in PDF format to an e-mail destination.

To use the resubmit for filtering function, you do not need to specify any special JCL parameters. When you print a data set that contains line or AFP data, you can specify the same JCL parameters as you usually do when you print to a PSF-controlled printer; however, you must direct the data set to IP PrintWay instead of to the PSF for OS/390 printer. In the printer definition, your administrator can specify default values for some of the parameters that you can specify on the DD and OUTPUT JCL statements; therefore, you can omit JCL parameters that have suitable defaults.

Limitations: The resubmit for filtering function has the following limitations:

- Do not code the DEST=IP, PRTQUEUE, and PORTNO JCL parameters on the OUTPUT JCL statement because IP PrintWay ignores these parameters.
- JES2 output grouping is not supported. Each output data set is placed in a separate JES output subgroup, regardless of the value specified in the GROUPID parameter on the OUTPUT JCL statement.

Related information:

- "JCL Parameters Used to Transform AFP and Line Data to PCL, PostScript, or PDF Format" on page 128
- JCL Examples:
  - "Print Line or AFP Data on a PostScript or PCL Printer Using the Resubmit for Filtering Function" on page 148
  - "Send Line or AFP Data to an E-mail Destination as PDF Data and Print the AFP Data on an AFP Printer" on page 147
- *z/OS Infoprint Server Operation and Administration* contains more information about how the resubmit for filtering function works and how to select it in the printer definition.

JCL Parameters

This section describes JCL parameters that have special considerations when you print data sets using IP PrintWay or when you use the Print Interface subsystem. You can find detailed information about the following types of JCL parameters:

JCL Parameters	See Page:
Parameters for printing with IP PrintWay	116
Parameters for transforming AFP data and line data to PCL, PostScript, or PDF format	128
Parameters for the Print Interface subsystem	137
Parameters for distributing output	141
Parameters for printing with Infoprint Manager for AIX or Infoprint Manager for Windows	142

For more information about JCL parameters, refer to *z/OS MVS JCL Reference*.

JCL Parameters for Printing with IP PrintWay

This section describes JCL parameters that IP PrintWay uses when it sends a data set to a printer or to an e-mail destination. You can specify these JCL parameters on either the DD or OUTPUT JCL statement. If you specify the same parameter on both JCL statements, the parameter on the DD statement is used.

DD JCL Statement:

COPIES=*nnn*
DEST={(*node*,*destination_name*) | *destination_name*}
DSNAME=&&*dataset_name*
FCB=*fcb_name*
SYSOUT=(*class*,,*form_name***)**
TITLE='*description of output*'

OUTPUT JCL Statement:

CLASS=*class*
COPIES=*nnn*
DEST={[*node*.]*destination_name* | '[*node*.]**IP:***host*'}
DUPLEX={NO | NORMAL | TUMBLE}
FCB=*fcb_name*
FORMS=*form_name*
FSSDATA='printer=*printer_definition_name*'
NOTIFY=([*node*.]*userid*,...**)**
[**PORTNO=***port_number* | **PRTQUEUE='***print_queue*']
PRTOPTNS='*component_name*'
RETAINF={'*hhhh*:*mm*:*ss*' | **FOREVER**}
RETAINS={'*hhhh*:*mm*:*ss*' | **FOREVER**}
RETRYL=*nnnnn*
RETRYT='*hhhh*:*mm*:*ss*'
TITLE='*description of output*'

Figure 10. Summary of JCL Parameters for All Output Processed by IP PrintWay

CLASS=*class*

Specifies the 1-character alphanumeric output class of the data set. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the destination name and form name, to select a printer definition in the Printer Inventory to format and print the data set. Ask your administrator which class to specify.

Default:

- If the Print Interface subsystem processes the data set, the class in the printer definition is used. If none is specified, JES determines the default class.
- If the Print Interface subsystem does not process the data set, JES determines the default class.

Notes:

1. You can also specify the class in the SYSOUT parameter of a DD JCL statement.
2. If you specify more than one parameter that can be used to locate a printer or e-mail destination, IP PrintWay uses the following priorities:
   a. The printer's host name or IP address specified by the DEST=IP parameter
   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter

d. The printer's address or the e-mail address specified in the printer definition that matches the values of any combination of the DEST=*destination_name*, CLASS, and FORMS parameters

Examples:

In the following example, IP PrintWay uses the printer definition associated with CLASS P and DEST MYPRINT to process the data set.

```
//OUTDS  OUTPUT CLASS=P,DEST=MYPRINT
//DD1    DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

In the following example, the Print Interface subsystem and IP PrintWay use the printer definition named `myprinter` to process the data set. CLASS=P does not affect which printer definition is used. However, the Print Interface subsystem allocates the data set on the JES spool in JES output class P and with destination name MYPRINT.

```
//OUTDS  OUTPUT CLASS=P,DEST=MYPRINT
//DD1    DD SUBSYS=(AOP1,'myprinter'),OUTPUT=(*.OUTDS)
```

COPIES=*nnn*

Specifies the number of copies you want to print, from 1 to 255.

Notes:

1. Only one copy prints when you print to VTAM-controlled printers or to Internet Printing Protocol (IPP) printers that do not support the **copies** IPP job attribute.

   To print copies in these cases, specify multiple OUTPUT statements and refer to them in the OUTPUT parameter of the DD statement, for example:

   ```
   //OUTDS1 OUTPUT FSSDATA='printer=myprinter'
   //OUTDS2 OUTPUT FSSDATA='printer=myprinter'
   //DD1    DD SYSOUT=P,OUTPUT=(*.OUTDS1,*.OUTDS2)
   ```

   This work-around creates multiple output data sets on the JES spool. However, this work-around cannot be used if the Print Interface subsystem processes the data set because the subsystem ignores all but the first reference to an OUTPUT statement.
2. Group values that you specify on this parameter are ignored.
3. This parameter is ignored when you send data to an e-mail destination.
4. The administrator can limit the number of copies that you can specify. If you request more than the allowed number of copies, the data set does not print.
5. If you use the Print Interface subsystem to process the data set, you can specify up to 32640 copies in the **copies** job attribute. Specify the **copies** job attribute in the SUBSYS parameter on the DD JCL statement.

Default:

- If the Print Interface subsystem processes the data set, the number of copies in the printer definition is used. If none is specified, JES determines the default number of copies.
- If the Print Interface subsystem does not process the data set, JES determines the default number of copies.

Examples:

```
//DD1    DD     COPIES=14
//OUTDS  OUTPUT COPIES=14
```

DEST={[*node***.]***destination_name* **| '[***node***.]IP:***host***'}**
Specifies either the destination name or the IP address of the printer's host system.

DEST=[*node***.]***destination_name*
Specifies the node name and destination name of the printer's host system.

node
Specifies the 1 to 8 character node name of the printer's host system. The node name is optional. If you specify the node name in the DEST parameter on a DD JCL statement, use the following format: DEST=(*node*,*name*).

Default:

- If the Print Interface subsystem processes the data set, the JES node in the printer definition is used. If none is specified, JES determines the default node.
- If the Print Interface subsystem does not process the data set, JES determines the default node.

destination_name
Specifies the destination name of the printer. The name must consist of 1 to 8 alphanumeric or national ($,#,@) characters. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the class and form name, to select a printer definition to format and print the data set. Ask your administrator which destination name to specify.

Note: If you use the Print Interface subsystem, specify the DEST parameter on the OUTPUT JCL statement. The subsystem ignores the DEST parameter on the DD statement.

Examples: In the following examples, IP PrintWay uses the printer definition associated with CLASS P and DEST PRT003 to process the data set.

```
//DD1   DD     SYSOUT=P,DEST=PRT003
```

or

```
//OUTDS OUTPUT DEST=BOULDER.PRT003
//DD1   DD     SYSOUT=P,OUTPUT=(*.OUTDS)
```

DEST='[*node***.]IP:***host***'**
Specifies the node name and the IP address of the printer's host system.

node
Specifies the 1 to 8 character node name of the printer's host system. The node name is optional.

Default:

- If the Print Interface subsystem processes the data set, the JES node in the printer definition is used. If none is specified, JES determines the default node.
- If the Print Interface subsystem does not process the data set, JES determines the default node.

host
Specifies the 1 to 115 character IP address of the printer's host system in either of the following formats. Always enclose the IP keyword and value in single quotation marks.

Dotted decimal address
A series of integers within the range of 0 to 255, separated by periods (decimal address), for example:

```
9.99.12.85
```

Host name
A series of domain names that can contain alphanumeric characters and dashes (–), separated by periods (.). The first character must be alphabetic or numeric, for example:

```
leo.boulder.xyz.com
```

Default: The printer's IP address or host name in the printer definition is used.

Examples:

```
//OUTDS  OUTPUT DEST='IP:99.153.123.232'
//OUTDS  OUTPUT DEST='IP:XYZ.COM'
//OUTDS  OUTPUT DEST='NODE01.IP:XYZ.COM'
```

Notes:

1. JES does not use the host name or the IP address when determining whether the output data set meets its work-selection criteria. Therefore, if your administrator has defined destination as a JES work-selection criterion for IP PrintWay, specify DEST=*name* rather than DEST=IP. If you specify DEST=IP, JES will not find a match.
2. If you specify more than one parameter that can be used to locate the printer or e-mail destination, IP PrintWay uses the following priorities:
   a. The printer's host name or address specified by the DEST=IP parameter
   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter
   d. The printer's address or the e-mail address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters
3. If you specify a printer definition name in the FSSDATA or SUBSYS parameter and the printer definition does not specify the LPR or direct sockets printing protocol, IP PrintWay ignores the DEST=IP parameter.
4. Use the same method to identify the host system, either the host name or the IP address, in all references to the host system. Also, use the same lower and uppercase characters. This ensures that data sets transmitted to the same printer are transmitted in the correct order.
5. If the resubmit for filtering function is used, do not specify the DEST=IP parameter because IP PrintWay ignores it and instead uses the IP address in the printer definition.

DSNAME=&&*dataset_name*
Specifies the data set name to assign to the sysout data set. The z/OS system generates a qualified name for the sysout data set and uses the value you specify in the DSNAME parameter as the last qualifier in the name.

Begin the name with two ampersands (&&). Follow the ampersands with one to eight alphanumeric or national ($,#,@) characters, a hyphen, or a character X'C0'. The first character following the ampersands must be alphabetic or national ($,#,@).

Recommendations: Specify a DSNAME parameter so that you can identify printed output more easily and to give a meaningful name to an e-mail attachment:

- The fully-qualified data set name can be printed on page headers and on separator pages. Therefore, if you specify the DSNAME parameter, you can identify your output more easily. Whether or not a header or separator page prints depends on the IP PrintWay options your administrator has selected in the printer definition and how your administrator has configured the printer's separator page.
- If the resubmit for filtering function is used, the value you specify in the DSNAME parameter is also the last qualifier of the data set name of the *second* data set that Infoprint Server dynamically allocates on the JES spool while processing the data. Therefore, if you specify the DSNAME parameter, you can locate this second data set on the JES spool more easily.
- When IP PrintWay sends the data to an e-mail destination, the value you specify in the DSNAME parameter is used as the name of the e-mail attachment. If you do not specify this parameter, IP PrintWay uses the job name as the name of the e-mail attachment.

Default: The last qualifier of the fully-qualified data set name is a question mark (?).

Example:

```
//DD1 DD SYSOUT=P,DSNAME=&&FEBSALES
```

The z/OS system generates a data set name such as:

userid.jobname.jobid.Ddsnumber.FEBSALES

FEBSALES is the last qualifier of the fully-qualified name of the second data set that Print Interface allocates on the JES spool when the resubmit for filtering function is used.

FEBSALES is the name of the e-mail attachment that IP PrintWay sends to an e-mail destination.

FCB=*fcb_name*

Specifies the 1 to 4 character name of the forms control buffer (FCB) member of the SYS1.IMAGELIB library.

IP PrintWay searches the library first for FCB4*fcb_name*, then FCB2*fcb_name*, then FCB3*fcb_name* unless you are printing to a VTAM-controlled printer. In this case, IP PrintWay searches the SYS1.IMAGELIB library only for FCB2*fcb_name*.

IP PrintWay can use the FCB to format the data; however the administrator must select the IP PrintWay **Use FCB** formatting option in the printer definition. For more information about FCB processing, refer to *z/OS Infoprint Server Operation and Administration*.

Default:

- If the Print Interface subsystem processes the data set, the FCB in the printer definition is used. If none is specified, JES determines the default FCB.
- If the Print Interface subsystem does not process the data set, JES determines the default value. If JES does not provide a default value and the resubmit for filtering function is used, the FCB in the printer definition is used.

- The administrator can specify a default FCB name to JES in the JES initialization member of SYS1.PARMLIB.

Examples:

```
//DD1    DD     FCB=STD2
//OUTDS  OUTPUT FCB=STD2
```

FORMS=*form_name*

Specifies the 1 to 8 character form name. If the Print Interface subsystem does not process the data set, IP PrintWay can use this parameter, in combination with the class and destination name, to select a printer definition to format and print the data set. Ask your administrator which form name to specify.

Notes:

1. You can also specify the form name in the SYSOUT parameter of a DD JCL statement.
2. If you specify more than one parameter that can be used to locate a printer or e-mail destination, IP PrintWay uses the following priorities:
   a. The printer's host name or address specified by the DEST=IP parameter
   b. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
   c. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter
   d. The printer's address or the e-mail address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters
3. The administrator can limit the values that you can specify in this parameter. If you specify a value that is not allowed, the data set might not print.

Default:

- If the Print Interface subsystem processes the data set, the form name in the printer definition in the Printer Inventory is used. If none is specified, JES provides a default form name.
- If the Print Interface subsystem does not process the data set, JES provides a default form name.

Example:

```
//OUTDS  OUTPUT FORMS=WIDE
```

FSSDATA='printer=*printer_definition_name***'**

Specifies the 1 to 17 character name of the printer definition in the Printer Inventory.

Type the **printer** subparameter in *lower case*. The printer definition name is case-sensitive; enter it exactly as the name is specified in the Printer Inventory.

If you specify more than one parameter that can be used to locate a printer or e-mail destination, IP PrintWay uses the following priorities:

1. The printer's host name or address specified by the DEST=IP parameter
2. The printer's address or the e-mail address in the printer definition specified in the SUBSYS parameter
3. The printer's address or the e-mail address in the printer definition specified in the FSSDATA parameter

4. The printer's address or e-mail address in the printer definition that matches the values of any combination of the DEST=*name*, CLASS, and FORMS parameters

The printer definition named in the SUBSYS parameter overrides the printer definition name in this parameter.

Default:

- If the Print Interface subsystem processes the data set and no printer definition is named in the SUBSYS parameter, the Infoprint Server default printer definition is used.
- If the Print Interface subsystem does not process the data set:
  - If the DEST=IP parameter is specified, the IP PrintWay default printer definition is used.
  - If the DEST=IP parameter is not specified, the printer definition that matches the class, destination, and forms name is used.

Example:

```
//OUTDS  OUTPUT FSSDATA='printer=Printer5'
```

NOTIFY=([*node***.]*userid*,...)**

Specifies up to 4 user IDs that are notified when the data set has been successfully or unsuccessfully transmitted. Separate the user IDs with commas.

node
Specifies a 1 to 8 character node name. The node name is optional.

userid
Specifies a 1 to 8 character user ID.

IP PrintWay notifies the users when the transmission is successful, when the transmission fails, or when IP PrintWay deletes the data set from the JES spool.

Default: If either the Print Interface subsystem processes the data set or the resubmit for filtering function is used, the notify values in the printer definition apply. Otherwise, no users are notified.

Example:

```
//OUTDS  OUTPUT NOTIFY=(SEATTLE.JOE,SEATTLE.MARY)
```

PORTNO=*port_number*

Specifies the number of the port to use for a direct socket printing connection. The valid range is 100 to 65535.

IP PrintWay uses the number of the port specified in this parameter instead of the port number in the printer definition.

Notes:

1. Do not code both PORTNO and PRTQUEUE.
2. If you code DEST=IP, also code either PRTQUEUE or PORTNO.
3. If the printer definition does not specify the direct sockets printing protocol, IP PrintWay ignores this parameter.
4. If you code DEST=IP and PORTNO but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, IP PrintWay uses the direct sockets printing protocol to transmit the data to the specified port number.

5. If the resubmit for filtering function is used, do not code PORTNO because IP PrintWay ignores it and instead uses the port number specified in the printer definition.

Default: The printer's port number in the printer definition is used.

Example:

```
//OUTDS  OUTPUT PORTNO=2501
```

PRTOPTNS='*component_name***'**

Specifies the 1 to 16 character name of one or more *components* that contain printing options you want IP PrintWay to use. Ask your administrator for the name of components suitable for your data set. The component name is case-sensitive; enter it exactly as the components are defined in the Printer Inventory. If the name contains special characters (such as a dash) or lower case letters, enclose the name in single quotation marks.

A component is an entity in the Printer Inventory. IP PrintWay uses printing options specified in the following three types of components: Processing, IP PrintWay Options, and Protocol. If more than one type of component exists with the specified name, IP PrintWay uses options specified in all of the components with the specified name. If a component of one of the three types does not exist, IP PrintWay uses default values for the printing options that can be specified in the missing component.

IP PrintWay uses only a subset of all options that can be specified in these components. IP PrintWay ignores other options specified in these components and, instead, uses the options specified in the printer definition. Some of the options that IP PrintWay uses from components are:

- Whether to use the FCB to format the data set
- How many lines to print on a page
- Whether to print a header on each page
- Whether to translate a data set from extended binary-coded decimal interchange code (EBCDIC) to American Standard Code for Information Interchange (ASCII)
- Whether to transmit multiple data sets in a job at the same time
- Which installation-written exit routines to use

Refer to *z/OS Infoprint Server Operation and Administration* for more information about which options IP PrintWay uses from components and about how to define components for use with the PRTOPTNS parameter.

Note: If the resubmit for filtering function is used, do not specify the PRTOPTNS parameter. IP PrintWay ignores it and instead uses options specified in the printer definition.

Default: IP PrintWay determines the default printing options as follows:

1. The options specified in the printer definition are used.
2. For options not specified in the printer definition, IP PrintWay uses hard-coded default values.

Example:

```
//OUTDS  OUTPUT PRTOPTNS='PostScript'
```

PRTQUEUE='*print_queue***'**

Specifies the 1 to 127 character alphanumeric name of the target print queue.

This parameter may be case-sensitive. For example, on UNIX systems, `lp0` and `LP0` refer to different print queues. If the name contains special characters (such as a dash) or lower case letters, enclose the name in single quotation marks.

IP PrintWay uses the print queue specified in this parameter instead of the print queue name in the printer definition.

Notes:

1. Do not code both PORTNO and PRTQUEUE.
2. If you code DEST=IP, also code either PRTQUEUE or PORTNO.
3. If the printer definition does not specify the LPR printing protocol, IP PrintWay ignores this parameter.
4. If you code DEST=IP and PRTQUEUE parameter, but do not specify a printer definition name in either the FSSDATA or SUBSYS parameter, IP PrintWay uses the LPR printing protocol to transmit the data to the specified print queue.
5. If the resubmit for filtering function is used, do not code PRTQUEUE because IP PrintWay ignores it and instead uses the print queue name specified in the printer definition.

Default: The print queue name in the printer definition is used.

Example:

```
//OUTDS  OUTPUT PRTQUEUE='lpd0'
```

RETAINF={'*hhhh*:*mm*:*ss*' | **FOREVER }**

Specifies the period of time for which IP PrintWay retains the data set on the JES queue after a transmission fails and all requested retries have been attempted.

Specify the time in the format *hhhh*:*mm*:*ss*, where:

hhhh	is the number of hours (range 0 to 9999)
mm	is the number of minutes (range 0 to 59)
ss	is the number of seconds (range 0 to 59)

You can omit zeroes and colons to the left of the significant portion of the time value. Enclose the entire value in single quotation marks.

To retain data sets forever, enter `FOREVER`. In this case, IP PrintWay never automatically deletes failed data sets from the JES spool. The operator must delete the data set from the JES spool or retransmit the data set.

IP PrintWay uses the retention value specified in this parameter instead of the value in the printer definition.

Note that the retention period for failed transmissions is separate from the retry limit and time. The retention period indicates the amount of time that IP PrintWay retains data sets on the JES spool *after* the last retry fails.

Default: IP PrintWay determines the default value as follows:

1. The retain value in the printer definition is used.
2. No retention.

Examples:

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 48 hours.

```
//OUTDS  OUTPUT RETAINF='48:00:00'
```

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool until the administrator deletes it or retransmits it.

```
//OUTDS  OUTPUT RETAINF=FOREVER
```

RETAINS={'*hhhh*:*mm*:*ss*' | **FOREVER}**

Specifies the period of time for which IP PrintWay retains the data set on the JES queue after a successful transmission.

Specify the time in the format *hhhh*:*mm*:*ss*, where:

hhhh is the number of hours (range 0 to 9999)
mm is the number of minutes (range 0 to 59)
ss is the number of seconds (range 0 to 59)

You can omit zeroes and colons to the left of the significant portion of the time value. Enclose the entire value in single quotation marks.

To retain data sets forever, enter `FOREVER`. In this case, IP PrintWay ever automatically deletes successfully-transmitted data sets from the JES spool. The administrator must delete the data set from the JES spool.

IP PrintWay uses the retention time specified in this parameter instead of the value in the printer definition.

Note that the retention period for successful transmissions is separate from the retry limit and time. The retention period indicates the amount of time that IP PrintWay retains data sets on the JES spool *after* transmission succeeds.

Default: IP PrintWay determines the default value as follows:

1. The retain value in the printer definition is used.
2. No retention.

Examples:

- The following OUTPUT statement specifies that IP PrintWay should retain the data set on the JES spool for 4 hours.

```
//OUTDS  OUTPUT RETAINS='04:00:00'
```

- The following OUTPUT statement specifies that IP PrintWay should not retain the data set on the JES spool.

```
//OUTDS  OUTPUT RETAINS='0'
```

RETRYL=*nnnnn*

Specifies the maximum number of times that IP PrintWay is to retry an unsuccessful transmission. Specify a number from 0 to 32767.

IP PrintWay uses the retry limit specified in this parameter instead of the retry limit in the printer definition.

Recommendations:

- When you send the output data set to an e-mail destination, omit both the RETRYL and RETRYT parameters.
- Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 6 on page 127.

Example:

```
//OUTDS  OUTPUT RETRYL=10
```

Table 6. How Retry Limit and Retry Time Work Together

Retry Limit	Retry Time	IP PrintWay Action
Blank or 0	Any value	IP PrintWay does not retry the transmission.
>0	Blank or 0	IP PrintWay retries the transmission the specified number of times.
>0	>0 but <5 seconds	IP PrintWay retries the transmission the specified number of times at the specified interval.
>0	≥5 seconds	IP PrintWay retries the transmission one time immediately, then the specified number of times at the specified interval.

RETRYT='*hhhh***:***mm***:***ss***'**

Specifies the time interval between attempts to retransmit an unsuccessful transmission.

Specify the retry time in the format *hhhh*:*mm*:*ss*, where:

hhhh is the number of hours (range 0 to 9999)
mm is the number of minutes (range 0 to 59)
ss is the number of seconds (range 0 to 59)

You can omit zeroes and colons to the left of the significant portion of the time value. Enclose the retry time in single quotation marks.

IP PrintWay uses the retry time specified in this parameter instead of the retry time in the printer definition.

Recommendations:

- When you send the output data set to an e-mail destination, omit both the RETRYL and RETRYT parameters.
- Do not specify this parameter so that the value your administrator specifies in the printer definition is used. The value you specify can affect IP PrintWay performance.

Default: The retry value in the printer definition is used. If none is specified, see Table 6.

Examples: The following examples both specify that IP PrintWay should retry one time immediately, then wait 1 minute between subsequent retries:

```
//OUTDS  OUTPUT RETRYT='0000:01:00'
```

or

```
//OUTDS  OUTPUT RETRYT=1:00
```

SYSOUT=(*class,,form_name***)**

Specifies the class and the form name.

class
Specifies a 1 character alphanumeric class.

form_name
Specifies a 1 to 4 character form name.

You can also specify the output class and the form name in the CLASS parameter and FORMS parameter of an OUTPUT statement. To specify a form name longer than 4 characters, you *must* use the FORMS parameter of an OUTPUT statement.

Note: You must code either the SYSOUT or SUBSYS parameter, but do not code both parameters.

Example:

```
//DD1  DD SYSOUT=(P,,WIDE)
```

TITLE='*description of output***'**

A description of the output. This value can be printed on an IP PrintWay separator page or on a separator page (also called a banner page) written by the printer's LPD. Whether or not this value prints on a separator page depends on how your administrator has configured the separator page or how the LPD is implemented. If the output data set is sent to an e-mail destination, this value is the subject of the e-mail.

Specify 1 to 60 EBCDIC text characters. If the description contains spaces, special characters, or lowercase characters, enclose the value in quotation marks.

Recommendation: In a JES2 environment, if you want multiple output data sets in the same job step to be sent in the same e-mail, specify the TITLE parameter with exactly the same value for all output data sets.

Default:

- For a separator page created by an IP PrintWay exit: If the resubmit for filtering function is used or if the Print Interface subsystem processes the data set, the default value is the title specified in the Allocation section of the printer definition in the Printer Inventory. Otherwise, there is no default value.
- For the LPD's separator page: If the resubmit for filtering function is used or if the Print Interface subsystem processes the data set, the default value is the title specified in the Allocation section of the printer definition in the Printer Inventory. Otherwise, the default value is the title or filename your administrator specified in the Protocol section of the printer definition; if none is specified, the default value is the fully-qualified data set name.
- For the subject of an e-mail: If the resubmit for filtering function is used or if the Print Interface subsystem processes the data set, the default value is the title specified in the printer definition in the Printer Inventory. Otherwise, the default subject is the job name.

Example:

```
//OUTDS  OUTPUT TITLE='Annual Report'
```

JCL Parameters Used to Transform AFP and Line Data to PCL, PostScript, or PDF Format

This section describes JCL parameters that the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use. These parameters apply to AFP or line data jobs that Print Interface automatically transforms from line data or AFP data to another format.

The parameters are summarized in Figure 11 on page 129. All parameters are optional.

DD JCL Statement:

CHARS=(*font_name1*[,*font_name2*][,*font_name3*][,*font_name4*]**)**
UCS=*font_name*

OUTPUT JCL Statement:

CHARS=(*font_name1*[,*font_name2*][,*font_name3*][,*font_name4*]**)**
DUPLEX={NO | NORMAL | TUMBLE}
FORMDEF=*form_definition_name*
INTRAY=*nnn*
OFFSETXB=*nnnn*[.*mmm*]*unit*
OFFSETXF=*nnnn*[.*mmm*]*unit*
OFFSETYB=*nnnn*[.*mmm*]*unit*
OFFSETYF=*nnnn*[.*mmm*]*unit*
OUTBIN=*1-65 535*
OVERLAYB=*overlay_name*
OVERLAYF=*overlay_name*
PAGEDEF=*page_definition_name*
PRMODE={SOSI1 | SOSI2 | SOSI3}
TRC={YES | NO}
UCS=*font_name*
USERLIB=(*'library_name'***[,**...**]**)

Figure 11. Summary of JCL Parameters for All Line and AFP Output to be Transformed to PCL, PostScript, or PDF Format

In most cases, transforms interpret the parameters in the same way as PSF for OS/390 does, so that you can use the same JCL that you use when the output is printed on IBM AFP printers. The following parameters have different characteristics when used with these transforms:

- **CHARS:** If the page definition used to print the job is the system default page definition and the page definition specifies a font, the transforms do not use the font specified in the CHARS parameter; instead, the transforms use the font in the page definition. PSF for OS/390, on the other hand, uses the font specified in the CHARS parameter.
- **INTRAY:** The transforms use default input tray 1. PSF for OS/390, on the other hand, uses the printer's default source.

The parameters you can specify are:

CHARS=(*font_name1***[,***font_name2***][,***font_name3***][,***font_name4***])**
Specifies the 4-character member name of the coded font that you want to use to print a data set that contains line data. You can specify up to four fonts.

font_name
Specifies the name of a coded font (in a font library) containing four or fewer characters, not including the prefix.

Note: Some coded fonts have six-character names, not counting the prefix. For these coded fonts, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for the four-character alternate coded font name.

When you uses CHARS to specify the member name, do not include the 2-character prefix of the coded-font name (X0 through XG).

Coded fonts that can be used with the CHARS parameter are supplied with the IBM AFP Font Collection. The fonts you specify must reside in a font library assigned to the transform in the transform configuration file or in a user library specified with the USERLIB JCL parameter, or else they must be inline with the data set. For details about available fonts and the naming conventions, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*.

If you specify more than one font with the JCL CHARS parameter, you must use the TRC parameter to tell these transforms which font to use for each line of data.

Raster fonts are used unless the administrator has requested font mapping to outline fonts and your font name is in the font mapping table.

If the page definition specifies fonts, the transforms ignore the CHARS parameter.

Default: The transforms use the first value found in the following order:

1. The font specified in the page definition
2. The font specified in the UCS JCL parameter
3. The font specified in the printer definition
4. The default font supplied by JES, but only if the Print Interface subsystem does not process the data set
5. The font specified in the Infoprint Server transform configuration file
6. Font X060D9

Examples:

```
//DD1 DD CHARS=(GT10,GT12)
```

or

```
//OUTDS OUTPUT CHARS=(GT10,GT12)
```

DUPLEX={NO | NORMAL | TUMBLE}

Specifies whether printing is to be done on both sides of each sheet.

NO The job is printed only on the front side of each sheet.

NORMAL
The job is printed on both sides of the sheet so that the top of side 1 is the top of side 2 (for side binding).

TUMBLE
The job is printed on both sides of the sheet so that the top of side 1 is the bottom of side 2 (for top binding).

Note: The administrator can limit the value that you can specify in this parameter. If you specify a value that is not allowed, the data set might not print.

Default: The transforms use the first value found in the following order:

1. The duplex option specified in the printer definition
2. The duplex option specified in the form definition

Example:

```
//OUTDS OUTPUT DUPLEX=NORMAL
```

FORMDEF=*form_definition_name*

Specifies the member name (from one to six alphanumeric or national characters) of the form definition you want to use. Omit the system prefix, F1, from the name; these transforms add F1 to the member name you specify.

The form definition you use may be stored in any of the following places:

- In a system library assigned to these transforms
- In a user library referred to in the printer definition.
- In a user library referred to in your JCL
- Inline in the print data set

Using Form Definitions from a User Library: You can instruct these transforms to select a form definition from your user library rather than from a system library assigned to these transforms. To use a form definition from a user library, do the following:

- Refer to the user library containing the form definition in your JCL. For details, see the USERLIB parameter.
- Specify the name of the form definition in the JCL FORMDEF parameter.

Using Inline Form Definitions: To use an inline form definition, do the following:

- Include the inline form definition in the print data set.
- If you specify the FORMDEF parameter, ensure that the name of the inline form definition matches the form definition name that you specified, or else specify FORMDEF=DUMMY. If you do not specify the FORMDEF parameter, these transforms select the first inline form definition in the print data set.
- Ensure that the data set is identified as containing carriage control characters.

You can include more than one inline form definition in a print data set, and you can change the form definition name in the JCL for different printing jobs to test different form definitions. If the name of an inline form definition does not match the FORMDEF name specified in the JCL, these transforms use the form definition from the resource library that matches the name in the JCL.

Default: The transforms use the first value found in the following order:

1. The form definition specified in the printer definition
2. The first inline form definition
3. The form definition specified in the Infoprint Server transform configuration file
4. Form definition F1CP0111

Example: To specify F1USER10 as the form definition, enter the following:

```
//OUTDS OUTPUT FORMDEF=USER10
```

INTRAY=*nnn*

Specifies the one to three decimal digit number from 1 to 255 that identifies the tray from which paper is to be selected. These transforms map this tray number to the tray number of the PCL or PostScript printer, using

tray-mapping values specified by the administrator in the transform configuration file. See “input-tray-number” on page 94 for more information about tray mapping.

The value you specify for this attribute overrides any input tray selection in the AFP data stream or in the form definition.

Default: The transforms use the first value found in the following order:

1. The input tray specified in the printer definition
2. The input tray selected in the AFP data stream
3. The input tray specified in the form definition
4. Tray 1

Example:

```
//OUTDS OUTPUT INTRAY=4
```

OFFSETXB=*nnnn***[.***mmm***]***unit*

Specifies the X offset of the logical page origin to the right of the physical page origin on the back side of a double-sided sheet.

For unit, specify one of the following units:

Unit	Meaning
IN	Specifies a unit of inches
CM	Specifies a unit of centimeters
MM	Specifies a unit of millimeters
PELS	Specifies a unit of picture elements (1/240 inch)
POINTS	Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in the following order:

1. The offset specified in the printer definition
2. The offset specified in the form definition

OFFSETXF=*nnnn***[.***mmm***]***unit*

Specifies the X offset of the logical page origin to the right of the physical page origin on the front of the sheet.

For unit, specify one of the following:

IN Specifies a unit of inches

CM Specifies a unit of centimeters

MM Specifies a unit of millimeters

PELS Specifies a unit of picture elements (1/240 inch)

POINTS
Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in the following order:

1. The offset specified in the printer definition

2. The offset specified in the form definition

OFFSETYB=*nnnn***[.***mmm***]***unit*

Specifies the Y offset of the logical page origin below the physical page origin on the back side of a double-sided sheet.

For unit, specify one of the following:

IN Specifies a unit of inches

CM Specifies a unit of centimeters

MM Specifies a unit of millimeters

PELS Specifies a unit of picture elements (1/240 inch)

POINTS
Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in the following order:

1. The offset specified in the printer definition
2. The offset specified in the form definition

OFFSETYF=*nnnn***[.***mmm***]***unit*

Specifies the offset in the Y direction of the logical page origin below the physical page origin on the front of the sheet.

For unit, specify one of the following:

IN Specifies a unit of inches

CM Specifies a unit of centimeters

MM Specifies a unit of millimeters

PELS Specifies a unit of picture elements (1/240 inch)

POINTS
Specifies a unit of points (1/72 inch)

Note: If you specify the unit as PELS or POINTS, you must specify the value as a whole number with no decimal point.

Default: The transforms use the first value found in the following order:

1. The offset specified in the printer definition
2. The offset specified in the form definition

Example: The following example sets the page origin to .5 inches, 1.1 inches on the front side, and 1.5 inches, 1.1 inches on the back side:

```
//OUTDS OUTPUT OFFSETXF=0.5IN,OFFSETYF=1.1IN,
//            OFFSETXB=1.5IN,OFFSETYB=1.1IN
```

OUTBIN=*1-65 535*

Specifies the 1- to 5-decimal-digit identifier of the output bin into which Infoprint Server will place a print job. If the printer does not support the selection of an output bin, the job is stacked in the default output bin for the printer.

When you print to a PCL or PostScript printer, instead of to an AFP printer, specify the output bin number of the PCL or PostScript printer. The value you specify for this parameter overrides any output bin that the form definition specifies.

Default: The transforms use the first value found in the following order:

1. The output bin specified in the printer definition
2. The output bin selected in the AFP data stream
3. The output bin specified in the form definition

Example:

```
//OUTDS OUTPUT OUTBIN=4
```

OVERLAYB=*overlay_name*

Specifies the member name (from one to eight alphanumeric or national characters) of a medium overlay to be placed on the back side of each sheet in a two-sided job, in addition to overlays from other sources. Specify the complete name of the overlay member because these transforms do not add an O1 prefix.

Default: The transforms use the first value found in the following order:

1. The overlay specified in the printer definition
2. The overlay specified in the form definition

OVERLAYF=*overlay_name*

Specifies the member name (from one to eight alphanumeric or national characters) of a medium overlay to be placed on the front side of each sheet, in addition to overlays from other sources. Specify the complete name of the overlay member because these transforms do not add an O1 prefix.

Default: The transforms use the first value found in the following order:

1. The overlay specified in the printer definition
2. The overlay specified in the form definition

Example: This example requests overlay O1FOVLY be placed on the front side of each sheet and overlay O1BOVLY be placed on the back side of each sheet:

```
//OUTDS OUTPUT OVERLAYF=O1FOVLY,OVERLAYB=O1BOVLY
```

PAGEDEF=*page_definition_name*

Specifies the member name (from one to six alphanumeric or national characters) of the page definition you want to use. When you specify the name in the JCL, omit the system prefix, P1; these transforms add it automatically.

If a PAGEDEF parameter is not coded in your JCL, these transforms use the page definition specified in the printer definition. If no form definition is specified in the printer definition, these transforms use the form definition in the Infoprint Server transform configuration file.

The page definition you use may be stored in any of the following places:

- In a system library assigned to these transforms
- In a user library referred to in the printer definition.
- In a user library referred to in your JCL
- Inline in the print data set

Using Page Definitions from a User Library: You can instruct these transforms to select a page definition from your user library rather than from a system library assigned to these transforms. To use a page definition from a user library, do the following:

- Include in your JCL a reference to the user library that contains the page definition.
- Specify the name of the page definition in the JCL PAGEDEF parameter of your JCL.

Using Inline Page Definitions: To use an inline page definition, do the following:

- Include the inline page definition in the print data set.
- If you specify the PAGEDEF parameter, ensure that the name of the inline page definition matches the name of the page definition name that you specified, or else specify PAGEDEF=DUMMY.
- If you do not specify the PAGEDEF parameter, these transforms select the first inline page definition in the print data set, unless a JES default page definition exists.
- If a page definition resource is included inline with the data, ensure to identify the data set as containing carriage control characters.

You can include more than one inline page definition in a print data set, and you can change the page definition name in the JCL on different printing jobs to test different page definitions. If, however, the name of an inline page definition does not match the PAGEDEF name specified in the JCL, these transforms use the page definition from the resource library that matches the name in the JCL.

Default: The transforms use the first value found in the following order:

1. The page definition specified in the FCB parameter
2. The page definition specified in the printer definition
3. The FCB value specified in the printer definition
4. The default page definition supplied by JES, but only if the Print Interface subsystem does not process the data set
5. The first inline page definition
6. The page definition specified in the Infoprint Server transform configuration file
7. Page definition P1P08682

Example: In this example, P1USER10 is the page definition name:

```
//OUTDS OUTPUT PAGEDEF=USER10
```

PRMODE={SOSI1| SOSI2 | SOSI3}

Specifies the type of data in the print data set and whether these transforms must perform optional processing of the data.

SOSI1

Specifies that each shift-out, shift-in code is to be converted to a blank and a Set Coded Font Local text control.

SOSI2

Specifies that each shift-out, shift-in code is to be converted to a Set Coded Font Local text control.

SOSI3
Specifies that the shift-in code is to be converted to a Set Coded Font Local text control and two blanks. A shift-out code is to be converted to a Set Coded Font Local text control.

JES uses values in the PRMODE parameter for job routing. These transforms ignore all values except SOSI1, SOSI2, and SOSI3, which they use to format data sets that contain both single-byte and double-byte fonts.

Remember the following when you use the SOSI process:

- For the process to work correctly two fonts must be specified in the CHARS parameter or in a page definition font list. The first font specified must be the single-byte font, and the second font must be the double-byte font.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.

Default:

- If the Print Interface subsystem processes the data set, the value in the printer definition is used. If none is specified in the printer definition, JES provides a default value; however, the transforms do not use the JES default value.
- If the Print Interface subsystem does not process the data set, JES provides a default value.

Example:

```
//OUTDS OUTPUT CHARS=(font_name1,font_name2),PRMODE=SOSI1
```

TRC={YES|NO}
Specifies whether the print data set contains table reference characters (TRCs).

In line data, you can use different fonts on different lines of a file by specifying TRCs at the beginning of each line after the carriage control characters, if any are present.

Examples:

```
//OUTDS OUTPUT CHARS=(GT10,GT12),TRC=YES
//DD2   DD     CHARS=(GT10,GT12),DCB=OPTCD=J
```

When you use table reference characters, remember the following:

- If the TRC=YES and the page definition does not identify fonts, you must specify fonts with the CHARS parameter.
- The order in which the fonts are specified in the CHARS parameter establishes which number is assigned to each associated TRC. For example, the TRCs for the fonts in the preceding example are zero for *font_name1* and one for *font_name2*.
- If you do not specify TRC=YES, but your line data contains a TRC as the first character of each line (or the second character if carriage control characters are used), the TRC is not used as a font identifier, but is printed as a text character.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.

UCS=*font_name*
Serves as another way to select a font. When a CHARS parameter is not

specified, you can specify the universal character set (UCS) parameter to select one font. If the page definition specifies a font, the UCS parameter is ignored.

Example:

```
//DD1 DD UCS=GT10
```

USERLIB=(*'library_name***[,...])**
Specifies the name of one to eight cataloged MVS data sets (user libraries) containing AFP resources for processing the data set. The transforms dynamically allocate these data sets and search for resources in them in the order specified on the USERLIB statement. If the transforms find no resources, they search the system libraries defined in the Infoprint Server transform configuration file. The libraries you specify can contain any AFP resources: fonts, page segments, overlays, page definitions, form definitions, or object container resources.

Note: In order for the transforms to use these libraries, the libraries must have RACF universal read access.

Default: The transforms use the first value found in the following order:

1. Resource libraries specified in the printer definition
2. Resource libraries specified in the Infoprint Server transform configuration file or, if no library is specified, a hard-coded default resource library

Example: In this example, the USERLIB parameter tells the transforms to search the libraries specified for AFP resources.

```
//OUTDS OUTPUT USERLIB=('USER.IMAGES','USER.AFP.RESOURCES')
```

JCL Parameters for the Print Interface Subsystem

This section describes how to code the SUBSYS JCL parameter to request that the Print Interface subsystem process a data set. It also describes the parameters of the DD and OUTPUT JCL statements that apply when you use the Print Interface subsystem.

DD JCL Statement:

SUBSYS=(*subsystem_name***[,['***printer_definition_name***'][,'***attribute=value ...***']])**

Figure 12. SUBSYS Parameter for the Print Interface Subsystem

Where:

SUBSYS=(*subsystem_name***[,'[***printer_definition_name***'][,'***attribute=value ...***']])**
Specifies that the Print Interface subsystem is to process this data set.

The Print Interface subsystem supports the following positional subparameters:

subsystem_name
Specifies the name of the Print Interface subsystem. This name must be the same as the Inventory name that is specified in the Infoprint Server configuration file. The Printer Inventory name is usually AOP1.

Default: None.

'*printer_definition_name*'

Specifies the name of the printer definition in the Printer Inventory that the subsystem uses to process the data set. This name is case sensitive. If the name includes any lowercase characters or special characters, enclose the name in single quotation marks. If you want to omit this parameter, but still specify job attributes, code a comma to indicate the printer definition name is omitted.

Default: The first printer definition name found, using the following order.

1. The printer definition name specified in the FSSDATA parameter on the OUTPUT JCL statement.
2. The Infoprint Server default printer definition. The name of the Infoprint Server default printer definition is specified in the Printer Inventory; the default name is `lp1`.

'*attribute*=*value* ...'

Specifies Infoprint Server job attributes that the subsystem uses to process and print the data set. See Chapter 3, “Using Job Attributes” on page 83 for a list of valid job attributes.

Rules:

- Attribute names and values are case-sensitive. All attribute names are lower case.
- Enclose the entire list of job attributes in single quotation marks.
- Separate job attributes with one or more spaces.
- If an attribute value contains blanks or special characters, enclose that attribute value in double quotation marks.
- You can specify up to 120 characters of job attributes.
- To continue the SUBSYS parameter on another line, end the first line with a comma at the end of a complete subparameter.
- If you cannot fit all job attributes on one line, refer to *z/OS MVS JCL Reference* for information about how to continue a parameter field enclosed in apostrophes.

Tip: If you want to specify more than 120 characters of job attributes, instead, specify the JCL parameter that corresponds to the job attribute. For example, specify the COPIES JCL parameter instead of the **copies** job attribute. Or, specify the job attributes in an attributes file.

Overrides: Job attributes override values specified in corresponding parameters of the DD and OUTPUT JCL statements. See Appendix B, “JCL Parameters and Corresponding Job Attributes” on page 191 for a list of job attributes and their corresponding JCL parameters.

Using an attributes file: You can store attributes and values in an MVS data set or in a UNIX file (such as an HFS file). Follow these rules:

- Specify the MVS data set name or UNIX file name from which attributes are to be read in the attribute called **attributes**.
- If attributes are in an MVS data set, specify the fully-qualified MVS data set name, and code four single quotation marks before the data set name and four single quotation marks after it.
- Because Print Interface must be able to read the attributes data set, give the MVS data set RACF universal read access and set the UNIX file permissions to let everyone read the file.
- See “Attributes Files” on page 84 for information about how to specify the attributes in the attributes file.

Default: The first value found for each job attribute, using the following order:

1. The value in a corresponding JCL parameter specified on the DD statement
2. The value in a corresponding JCL parameter specified on the first OUTPUT statement referred to in the OUTPUT parameter on the DD statement
3. The value in a corresponding JCL parameter specified on the first default OUTPUT statement in the job step
4. The value in a corresponding JCL parameter specified on the first default OUTPUT statement in the job
5. The value specified in the printer definition
6. The JES default value for the corresponding JCL parameter; however, the JES default values for the CHARS, UCS, PAGEDEF, or FCB parameters are not used to transform data.

Examples:

- The following example shows how to submit output to the Print Interface subsystem named AOP1.

```
//DD1 DD SUBSYS=(AOP1,'myprinter')
```

- The following example shows how to submit output to the subsystem named AOP1 and specify that the output from the transform should include only pages 1 through 10 and that the output should be printed on both sides of the sheet. The PCL to AFP, PostScript to AFP, and PDF to AFP transforms support the **-p** option.

```
//DD1 DD SUBSYS=(AOP1,'myafpprinter',
//       'filter-options="-p 1-10" duplex=yes')
```

- The following example shows how to submit output to the subsystem named AOP1 and specify attributes in an HFS file named /u/myuserid/myattributes:

```
//DD1 DD SUBSYS=(AOP1,'myprinter','attributes=/u/myuserid/myattributes')
```

Parameters of the DD JCL Statement Supported by the Print Interface Subsystem

Table 7 summarizes the parameters on the DD JCL statement, other than the SUBSYS parameter, that the Print Interface subsystem supports. It also describes the special considerations that apply when you use the Print Interface subsystem.

Table 7. Parameters of the DD JCL Statement Supported by the Print Interface Subsystem

DD Statement Parameter	Print Interface Subsystem Considerations
BURST CHARS COPIES FLASH UCS	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard default value is used; however, JES default values for the CHARS and UCS parameters are not used to transform data.
COPIES	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the default is one copy. The administrator can limit the number of copies that you can print. If you exceed the allowed limit, the Print Interface subsystem does not print any data sets in the job step. If you specify COPIES on both the DD and the OUTPUT JCL statement, COPIES on the DD statement is used.

Table 7. Parameters of the DD JCL Statement Supported by the Print Interface Subsystem (continued)

DD Statement Parameter	Print Interface Subsystem Considerations
DCB	Specify values in the DCB parameter that are suitable for data that your application writes to this DD statement. If you do not specify either the DCB OPTCD=J subparameter or the TRC parameter on the OUTPUT JCL statement, the TRC value in the printer definition is used.
DSNAME	Begin the name with two ampersands (&&). Follow the ampersands with one to eight alphanumeric or national ($,#,@) characters, a hyphen, or a character X'C0'. The first character following the ampersands must be alphabetic or national ($,#,@). If you specify another format, you receive a JCL error.
LRECL	Specify values in this parameter that are suitable for data that the application writes to this DD statement.
OUTPUT	Refer to only one OUTPUT JCL statement. The Print Interface subsystem ignores all references except for the first one.
SEGMENT SYSOUT	Not allowed. If you specify one of these parameters with the SUBSYS parameter, you receive a JCL error.
All other DD parameters	The Print Interface subsystem does not use any other DD parameters; however, JES might use them.

Parameters of the OUTPUT JCL Statement Supported by the Print Interface Subsystem

Table 8 summarizes the parameters of the OUTPUT JCL statement that the Print Interface subsystem supports. It also describes some special considerations that apply when you use the Print Interface subsystem.

Table 8. Parameters of the OUTPUT JCL Statement Supported by the Print Interface Subsystem

OUTPUT Statement Parameter	Print Interface Subsystem Considerations
CLASS DEST FORMS	IP PrintWay does not use these values to select a printer definition. The Print Interface subsystem and IP PrintWay use only the printer definition specified in the SUBSYS parameter or, if none is specified, the printer definition in the FSSDATA parameter. If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard JES default is used. The administrator can limit the values you can specify in the FORMS parameter. If you specify a value that is not allowed, you receive a JCL error.
COPIES DATACK DUPLEX	If you do not specify one of these parameters, the corresponding value in the printer definition is used. If none is specified, the standard JES default is used. The administrator can limit the values you can specify in these parameters. If you specify a value that is not allowed, you receive a JCL error.

Table 8. Parameters of the OUTPUT JCL Statement Supported by the Print Interface Subsystem (continued)

OUTPUT Statement Parameter	Print Interface Subsystem Considerations
DEFAULT	The Print Interface subsystem uses only *one* OUTPUT JCL statement, in the following order: 1. The first OUTPUT JCL statement referred to in the OUTPUT parameter on the DD statement. 2. The first OUTPUT JCL statement with DEFAULT=YES in the same job step. 3. The first OUTPUT JCL statement with DEFAULT=YES in the job.
GROUPID	The Print Interface subsystem uses the specified group ID; however, JES always places the output data set that Print Interface allocates on the JES spool in a separate JES output subgroup regardless of the value specified in this parameter.
JESDS	Ignored
All other OUTPUT parameters	If you do not specify a parameter on the OUTPUT statement, the corresponding value specified in the printer definition is used. If none is specified, the standard JES default is used; however, the JES default values for the PAGEDEF and FCB parameters are not used to transform data. Parameters defined after March 1, 2002 are not supported unless support was added in an Infoprint Server PTF.

JCL Statements Not Supported by the Print Interface Subsystem

The Print Interface subsystem does not support the following JCL statements:

- The JES2 /*OUTPUT JCL statement is ignored.
- The JES3 //*FORMAT JCL statement is ignored.

JCL Parameters for Distribution Information

Figure 13 summarizes the parameters you can specify on an OUTPUT JCL statement to help identify and distribute output:

OUTPUT JCL Statement:

ADDRESS=('*address text***'[,...])**
BUILDING='*building text***'**
DEPT='*department text***'**
NAME='*name text***'**
ROOM='*room text***'**
TITLE='*description of output***'**

Figure 13. Summary of JCL Parameters for the Distribution of Output

The values you specify in these parameters can be printed on a separator sheet if your installation writes an IP PrintWay exit that creates a separator sheet. IP PrintWay can also pass the value specified in the TITLE parameter to a remote printer. Depending on how the printer definition and the printer are configured, this title can print on the separator page (also called a banner page) generated by the printer's LPD.

AFP Parameters used to Print Remotely with Infoprint Manager or Infoprint Server

This section lists the JCL parameters that you can specify on an OUTPUT or DD statement for IP PrintWay to send to either Infoprint Manager or Infoprint Server running on a remote system. IP PrintWay sends these parameters to the target system only if the administrator selects the **Remote PSF** option in the printer definition in the Printer Inventory.

These JCL parameters specify AFP options that Infoprint Manager and PSF for OS/390 use when you print on an IBM AFP printer. Also, data transforms provided with Infoprint Manager and Infoprint Server Transforms can use some of these parameters when transforming AFP and line data to another format, such as PCL or PostScript.

IP PrintWay sends the values for the following JCL parameters to the target system:

ADDRESS	DEPT	INTRAY	OUTBIN
BUILDING	DEST	NAME	PAGEDEF
CHARS	DUPLEX	OFFSETXB	PRMODE[1]
CLASS	FCB	OFFSETXF	ROOM
COPIES	FORMDEF	OFFSETYB	TITLE
DATACK	FORMS	OFFSETYF	TRC
			UCS

1. Values other than SOSI1, SOSI2, and SOSI3 are ignored.

For information about how IP PrintWay sends these and other JCL values to Infoprint Manager, refer to *z/OS Infoprint Server Operation and Administration*.

JCL Examples

In the following examples, assume that:

- Class `P` is a JES work-selection criterion for the IP PrintWay output writer (FSA).
- Class `P` and destination `DEPT001` are printer-selection values specified in a printer definition.
- `pcl1` is a printer definition that does not specify a form name.
- `PS1` is a destination name.
- Class `P`, destination `DEPT002`, and form name `WIDE` are printer-selection values specified in another printer definition.
- `myoptions` is the name of a set of components in the Printer Inventory.
- `afpprinter` is the printer definition for a printer attached to a remote system running Infoprint Manager or Infoprint Server.

The following examples are all JES2 examples. For differences between JES2 and JES3, refer to *z/OS MVS JCL Reference*.

Direct Output to IP PrintWay and to a Printer By Specifying the Printer Definition Name

These examples show how to direct an output data set to IP PrintWay and to a printer by specifying the printer definition name.

Because these examples do not specify retry values, retention periods, or the name of an options component, IP PrintWay uses the values defined by your administrator

in this printer definition. If these values are not defined in the printer definition, IP PrintWay uses the standard defaults described in “JCL Parameters” on page 116.

1. In this example, the OUTPUT statement specifies the printer definition name `myprinter`.

```
//PWAYJOB1 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=myprinter'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the printer definition name `myprinter` and IP address `99.123.453`. IP PrintWay uses this IP address instead of the address defined in `myprinter`. It uses the rest of the information in the `myprinter` printer definition.

```
//PWAYJOB2 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=myprinter',DEST='IP:99.153.123.232'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct Output to IP PrintWay and to a Printer By Specifying a Host Name or an IP Address

These examples show how to direct an output data set to IP PrintWay and to a printer by specifying the host name or IP address of the target system and the name of the print queue.

Because these examples do not specify retry values, retention periods, or the name of an options component, IP PrintWay uses default values defined by your installation in a default printer definition. If no default printer definition exists, IP PrintWay uses the standard defaults described in “JCL Parameters” on page 116.

1. In this example, the OUTPUT statement specifies the printer’s host name `BOULDER.XYZ.COM` and print queue `lpd1`.

```
//PWAYJOB3 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:BOULDER.XYZ.COM',PRTQUEUE='lpd1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the IP address (`99.123.453`) and the name of the print queue (`lpd1`).

```
//PWAYJOB4 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='lpd1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct Output to IP PrintWay and to a Printer by Specifying DEST, CLASS, or FORMS

These examples show how to specify the destination, class, or form name to direct an output data set to a printer controlled by IP PrintWay. IP PrintWay uses a printer whose printer definition values matches the values you specify in the JCL.

You can override the name of the print queue in the printer definition, as shown in Example 3 on page 144.

1. In this example, the DD statement specifies a destination name, class, and form name. The destination name and class match values in a printer definition. The DD statement also specifies a form name, but the printer definition does not specify one. Therefore, IP PrintWay does not use the form name as a printer selection criterion.

```
//PWAYJOB5 JOB ...
//STEP1    EXEC PGM=USERA
//DD1      DD SYSOUT=(P,,WIDE),DEST=DEPT001
```

Note: If the form name is more than 4 characters, you must specify the name on the OUTPUT statement, as shown in Example 3.

2. In this example, the OUTPUT statement specifies destination name and class. It does not specify a form name. A JES default is used for the form name.

```
//PWAYJOB6 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST=DEPT001
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

3. In this example, the OUTPUT statement specifies the destination name, class, and form name. The print queue name, `lpd2`, overrides the name of the print queue specified in the printer definition.

```
//PWAYJOB7 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,FORMS=WIDE,DEST=DEPT002,PRTQUEUE='lpd2'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Direct Output to IP PrintWay and to More Than One Printer or E-mail Destination

These examples show how to direct a data set to IP PrintWay and to send it to more than one printer or e-mail destination at the same time by specifying multiple OUTPUT statements. The OUTPUT parameter on the DD statement refers to two OUTPUT JCL statements; therefore, JES creates two output data sets.

1. In this example, the OUTPUT statements specify two different destination names:

```
//PWAYJOB8 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT CLASS=P,DEST=DEPT001
//OUTDS2   OUTPUT CLASS=P,DEST=DEPT002
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1,*.OUTDS2)
```

2. In this example, the OUTPUT statements specify the IP addresses of two printers:

```
//PWAYJOB9 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='lpd1'
//OUTDS2   OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='lpd2'
//DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS1,*.OUTDS2)
```

Specify Components in the Printer Inventory

These examples show how to specify the name of Printer Inventory components defined by your administrator and used by IP PrintWay.

1. In this example, the OUTPUT statement specifies the name of a printer definition and the name of components in the Printer Inventory that contain IP PrintWay options. IP PrintWay uses components named `myoptions` instead of the options in the printer definition.

```
//PWAYJOBA JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT FSSDATA='printer=myprinter',PRTOPTNS='myoptions'
//DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS)
```

2. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses components named `myoptions` instead of the options in the default printer definition.

```
//PWAYJOBB JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
//         PRTOPTNS='myoptions'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Specify Retry Values

These examples show how to specify the following IP PrintWay retry values:

- Retry time of 1 minute. IP PrintWay retries a failed transmission one time immediately, then waits 8 minutes between retries.
- Retry limit of 3 times. If the immediate retry fails, IP PrintWay retries a maximum of 3 more times.

1. In this example, the OUTPUT statement specifies a printer definition name. IP PrintWay uses the retry values specified on the OUTPUT statement instead of the values in this printer definition.

   ```
   //PWAYJOBC JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT FSSDATA='printer=myprinter',
   //         RETRYL=3,RETRYT='0000:09:00'
   //DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS)
   ```

2. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses the retry values specified on the OUTPUT statement instead of the values in the default printer definition.

   ```
   //PWAYJOBD JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
   //         RETRYL=3,RETRYT='0000:09:00'
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

Specify Retention Periods

These examples show how to specify the following IP PrintWay retention periods:

- Retention period of 1 day (24 hours) if the transmission is successful
- Retention period of 4 days (96 hours) if the transmission fails

1. In this example, the OUTPUT statement specifies a printer definition name. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in this printer definition.

   ```
   //PWAYJOBE JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT FSSDATA='printer=myprinter',
   //         RETAINF='96:00:00',RETAINS='24:00:00'
   //DD1      DD SYSOUT=P,OUTPUT=(*.OUTDS)
   ```

2. In this example, the OUTPUT statement specifies a form and destination name. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in the printer definition for the printer that matches this form and destination name.

   ```
   //PWAYJOBF JOB ...
   //STEP1    EXEC PGM=USERA
   //OUTDS    OUTPUT CLASS=P,FORMS=WIDE,DEST=DEPT001,
   //         RETAINF='96:00:00',RETAINS='24:00:00'
   //DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS)
   ```

3. In this example, the OUTPUT statement specifies the name of the print queue and the IP address of the host. IP PrintWay uses the retention values specified on the OUTPUT statement instead of the values in the default printer definition.

```
//PWAYJOBG JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST='IP:99.153.123.232',PRTQUEUE='lpd1',
//         RETAINF='96:00:00',RETAINS='24:00:00'
//DD1      DD  SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Specify AFP Resources for Printing on a Remote PSF System

This example shows how to specify a page definition and coded font for printing on an AFP printer attached to a system that is running either Infoprint Manager or Infoprint Server with PSF for OS/390. IP PrintWay prefixes P1 to the specified page definition name before transmitting the value.

```
//PWAYJOBH JOB ...
//STEP1    EXEC   PGM=USERA
//OUTDS    OUTPUT CLASS=P,FSSDATA='printer=afpprinter',
//         CHARS=60DB,PAGEDEF=000001
//DD1      DD     SYSOUT=(,),OUTPUT=(*.OUTDS)
```

Note: The administrator must select the **Remote PSF** option in the printer definition in the Infoprint Server Printer Inventory.

Send Line Data to an E-mail Destination as Text Data

This example shows how to send two output data sets that contain line data to an e-mail destination in text format. This example specifies the subject of the e-mail in the TITLE parameter, and the names of the attachments in the DSNAME parameters.

This example assumes that the administrator has set up the printer definition in the Printer Inventory as follows:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected, and the recipient e-mail address list or a z/OS UNIX sendmail alias name is specified.
- No transform is specified for line data and the **Resubmit for filtering** option is not selected; therefore, IP PrintWay, by default, converts line data in the data set to text format.
- The **Concatenate job** option is selected in the **Dataset grouping** field. In a JES2 environment, this option causes IP PrintWay to send output data sets that are in the same JES output subgroup in the same e-mail.

```
//PWAYJOBI JOB ...
//STEP1    EXEC   PGM=USERA
//OUTDS    OUTPUT CLASS=P,TITLE='Monthly Report',
//         FSSDATA='printer=deptmail'
//DD1      DD     SYSOUT=(,),OUTPUT=(*.OUTDS),DSNAME=&&SALES
//DD2      DD     SYSOUT=(,),OUTPUT=(*.OUTDS),DSNAME=&&INVENTRY
```

Results: The recipients listed in the printer definition receive an e-mail:

- The sender of the e-mail is the user ID who ran the job, for example: USER1@DOMAIN1.
- The subject of the e-mail is `Monthly Report`.
- In a JES2 environment, the e-mail has two attachments: `SALES.txt` and `INVENTRY.txt`. Both attachments are in text format and can be viewed with any text editor.
- In a JES3 environment, two e-mails are sent. One e-mail contains attachment `SALES.txt`; the other e-mail contains attachment `INVENTRY.txt`. Both attachments are in text format and can be viewed with any text editor.

Send Line or AFP Data to an E-mail Destination as PDF Data and Print the AFP Data on an AFP Printer

This example shows how to (1) send an output data set with either line or AFP data to one or more e-mail addresses as an attachment in PDF format and (2) print it on an IBM AFP printer controlled by PSF for OS/390. This example specifies the subject of the e-mail in the TITLE parameter and the name of the attachment in the DSNAME parameter.

This example assumes that the administrator has set up a printer definition for the e-mail destination in the Printer Inventory:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected and the recipient e-mail address list or a z/OS UNIX sendmail alias name is specified in the printer definition.
- The AFP to PDF transform is specified for the line data and MO:DCA-P data formats, and the **Resubmit for filtering** option is selected.
- AFP resource libraries are specified either in the printer definition or in the transform configuration file, **aopxfd.conf**. If not, you must specify the USERLIB JCL parameter on the OUTDS1 OUTPUT statement.

This example also assumes that the system programmer has defined the PSF-controlled printer to JES so that JES directs data sets with CLASS F and DEST PRT633 to the PSF-controlled printer.

```
//PWAYJOBJ JOB ...
//STEP1    EXEC   PGM=USERA
//OUTDS1   OUTPUT CLASS=P,FORMDEF=MYDEF,TITLE='Monthly Report',
//         FSSDATA='printer=deptmail'
//OUTDS2   OUTPUT CLASS=F,FORMDEF=MYDEF,TITLE='Monthly Report',
//         DEST=PRT633'
//DD1      DD     SYSOUT=(,),OUTPUT=(*.OUTDS1,*.OUTDS2),DSNAME=&&REPORT
```

Results:

- The recipients listed in the printer definition `deptmail` receive an e-mail:
  - The sender of the e-mail is the user ID who ran the job, for example: USER1@DOMAIN1.
  - The subject of the e-mail is `Monthly Report`.
  - The e-mail attachment is named `REPORT.pdf` and is in PDF format. The attachment can be viewed with a PDF viewer such as Adobe Acrobat Reader.
- The file is printed on the PSF-controlled printer defined with JES work-selection criteria of CLASS F and DEST PRT633.

Send Line or AFP Data to an E-mail Destination as AFP Data

This example shows how to send an output data set that contains either AFP data or line data with AFP resources to an e-mail destination as an AFP file. This example specifies the subject of the e-mail in the TITLE parameter and the name of the attachment in the DSNAME parameter.

This example uses the IBM ACIF program to collect AFP resources into a separate file and concatenate that file to the line or AFP data file so that the e-mail recipient can view the file using the IBM AFP Viewer plug-in for Windows and also print the file.

This example assumes that the administrator has set up the printer definition in the Printer Inventory as follows:

- The IP PrintWay printer definition is named `deptmail`.
- The e-mail protocol is selected and the recipient e-mail address list or a z/OS UNIX sendmail alias name is specified in the printer definition.
- No transform is specified for the AFP data format, and the IP PrintWay formatting option **none** is selected.

```
//PWAYJOBK JOB ...
//ACIF     EXEC PGM=APKACIF,PARM='PARMDD=PARMS'
//SYSPRINT DD   SYSOUT=*
//INPUT    DD   DSNAME=MYFILE.AFP,DISP=SHR
//OUTPUT   DD   DUMMY
//RESOBJ   DD   DSNAME=&&RESLIB,DISP=(,PASS),
//         SPACE=(CYL,(5,5),RLSE),
//         UNIT=3390,VOL=SER=USR003,
//         DCB=(LRECL=12284,BLKSIZE=12288,RECFM=VBM)
//PARMS    DD   *
 INDEXOBJ = NONE          /* Do not create INDEX output */
 RESTYPE  = ALL           /* Collect all resource types */
 CCTYPE   = M             /* Carriage control type      */
 MCF2REF  = CF            /* Collect coded fonts        */
 FONTLIB  = SYS1.FONT300, /* Font libraries             */
            SYS1.FONTOLN
 USERLIB  = MY.USERLIB    /* Other user resources       */
 FDEFLIB  = SYS1.FDEFLIB  /* Form definition library    */
 FORMDEF  = F1MYFDEF      /* Form definition to use     */
/*
//IEBGENER  EXEC   PGM=IEBGENER,COND=(0,NE)
//SYSPRINT  DD     SYSOUT=*
//SYSIN     DD     DUMMY
//OUTDS     OUTPUT CLASS=P,TITLE='Monthly Report',
//           FSSDATA='printer=deptmail'
//SYSUT1    DD     DSNAME=*.ACIF.RESOBJ,DISP=(OLD,DELETE)
//           DD     DSNAME=MYFILE.AFP,DISP=SHR
//SYSUT2    DD     SYSOUT=(,),OUTPUT=(*.OUTDS),DSNAME=&&REPORT
```

Results: The recipients listed in the printer definition `deptmail` receive an e-mail:

- The sender of the e-mail is the user ID who submitted the job, for example: USER1@DOMAIN1
- The subject of the e-mail is `Monthly Report`.
- The e-mail attachment is named `REPORT.afp` and is in AFP format with all AFP resources inline. The attachment can be viewed with the IBM AFP Viewer plug-in for Windows.

Print Line or AFP Data on a PostScript or PCL Printer Using the Resubmit for Filtering Function

These examples show how to print line data and AFP data to a PostScript or PCL printer. These examples assume that your administrator has configured the printer definition in the Printer Inventory to use the AFP to PostScript or AFP to PCL transform and also selected the **Resubmit for filtering** option. Because the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use the same JCL parameters as PSF for OS/390 uses, you can specify the same JCL parameters as you do when you print on an AFP printer.

1. In this example, AFP output is sent to a PostScript printer. Because this example does not specify a form name, a JES default is used for the form name. The last qualifier of the fully-qualified data set name on the JES spool will be `MYFILE`. Because the **Resubmit for filtering** option is selected in the printer definition, Infoprint Server dynamically allocates a second output data set on the JES spool during processing. The last qualifier of this data set's fully-qualified name will also be `MYFILE`.

```
//TRJOB1 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS    OUTPUT CLASS=P,DEST=PS1
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS),DSNAME=&&MYFILE
```

2. In this example, an AFP job is sent to a PCL printer. It is printed with a user defined form definition `F1MYDEF` which is in the user library `MYLIB`.

```
//TRJOB2 JOB ...
//STEP1    EXEC PGM=USERA
//OUTDS1   OUTPUT CLASS=P,FORMDEF=MYDEF,USERLIB=MYLIB,FSSDATA='printer=pcl1'
//DD1      DD SYSOUT=(,),OUTPUT=(*.OUTDS1),DSNAME=&&MYFILE
```

Print Line or AFP Data on a PostScript Printer Using the Print Interface Subsystem

These examples show how to print line data and AFP data on a PostScript printer. These examples assume that your administrator has created two IP PrintWay printer definitions named `mypsprinter` and `anypsprinter` in the Infoprint Server Printer Inventory:

- The AFP to PostScript transform is specified in both printer definitions.
- Class P, the JES work-selection criterion for IP PrintWay, is specified in both printer definitions. Therefore, CLASS=P is not specified on the OUTPUT JCL statement in these examples.
- Printer definition `mypsprinter` contains the printer's IP address and print queue name.
- Printer definition `anypsprinter` specifies the LPR transmission protocol, but does *not* specify your printer's IP address and print queue name. Example 3 shows how to specify your printer's IP address and print queue name on the OUTPUT JCL statement.

1. In this example, the Print Interface subsystem named AOP1 transforms data in two data sets to PostScript format and writes the PostScript data to two output data sets on the JES spool. The last qualifiers of the data sets names are DATA1 and DATA2. The subsystem uses options specified in `mypsprinter`. IP PrintWay then prints both data sets on the printer whose address is specified in `mypsprinter`.

```
//SSJOB1 JOB ...
//STEP1  EXEC PGM=USERA
//DD1    DD SUBSYS=(AOP1,'mypsprinter'),DSNAME=&&DATA1
//DD2    DD SUBSYS=(AOP1,'mypsprinter'),DSNAME=&&DATA2
```

2. In this example, the Print Interface subsystem named AOP1 transforms data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options specified in `mypsprinter`; however, it uses form definition `F1MYDEF` in library `MYLIB` to transform the data. IP PrintWay then prints the data on the printer whose address is specified in `mypsprinter`.

```
//SSJOB2 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=MYDEF,USERLIB=MYLIB
//DD1    DD SUBSYS=(AOP1,'mypsprinter'),OUTPUT=(*.OUTDS1)
```

3. In this example, the Print Interface subsystem transforms data to PostScript format and writes the PostScript data to an output data set on the JES spool. The subsystem uses options specified in `anypsprinter`. IP PrintWay then prints the data to queue `myqueue` on the printer with IP address 99.153.123.232.

```
//SSJOB3 JOB ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT DEST='IP:99.153.123.232',PRTQUEUE='myqueue'
//DD1    DD SUBSYS=(AOP1,'anypsprinter'),OUTPUT=(*.OUTDS1)
```

Print PostScript, PCL, or PDF Data on an IBM AFP Printer Using the Print Interface Subsystem

These examples show how to print PostScript, PCL, and PDF data on an IBM AFP printer controlled by PSF for OS/390. These examples assume that your administrator has created two PSF for OS/390 printer definitions named `myafpprinter` and `anyafpprinter` in the Infoprint Server Printer Inventory:

- The PostScript to AFP, PCL to AFP, and PDF to AFP transforms are specified in both printer definitions. The **%filter-options** transform option is also specified to allow job submitters to specify transform options as shown in example 2.
- Printer definition `myafpprinter` specifies the class and destination name of the PSF-controlled printer. (CLASS and DEST are JES work-selection parameters that are typically used to direct output from the JES spool to a PSF-controlled printer.)
- Printer definition `anyafpprinter` does *not* specify the CLASS and DEST values for your PSF-controlled printer. Example 3 shows how to specify your printer's CLASS and DEST work-selection values on the OUTPUT JCL statement.

1. In this example, the Print Interface subsystem named AOP1 transforms data to AFP format and writes the AFP data to output data sets on the JES spool. The last qualifiers of the data sets names are DATA1 and DATA2. The subsystem uses options specified in printer definition `myafpprinter`. PSF for OS/390 then prints the data sets on the AFP printer whose CLASS and DEST values match those specified in `myafpprinter`.

   ```
   //SSJOB4 JOB ...
   //STEP1  EXEC PGM=USERA
   //DD1    DD SUBSYS=(AOP1,'myafpprinter'),DSNAME=&&DATA1
   //DD2    DD SUBSYS=(AOP1,'myafpprinter'),DSNAME=&&DATA2
   ```

2. In this example, the Print Interface subsystem transforms data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options specified in printer definition `myafpprinter`. Because the **filter-options** attribute is specified in the SUBSYS parameter, it writes only the first 10 pages of the transformed data to the output data set. PSF for OS/390 then prints the data set on the AFP printer whose CLASS and DEST values match those specified in `myafpprinter`. PSF for OS/390 uses form definition `F1MYDEF`, which is in library `MYLIB`, to format the AFP data.

   ```
   //SSJOB5 JOB ...
   //STEP1  EXEC PGM=USERA
   //OUTDS1 OUTPUT FORMDEF=MYDEF,USERLIB=MYLIB
   //DD1    DD SUBSYS=(AOP1,'myafpprinter',
   //       'filter-options="-p 1-10"'),
   //       OUTPUT=(*.OUTDS1)
   ```

3. In this example, the Print Interface subsystem named AOP1 transforms data to AFP format and writes the AFP data to an output data set on the JES spool. The subsystem uses options specified in printer definition `anyafpprinter`. The subsystem allocates the output data set with CLASS=F and DEST=PRT003. PSF for OS/390 then prints the data set on the AFP printer that processes data sets with CLASS=F and DEST=PRT003.

   ```
   //SSJOB6 JOB ...
   //STEP1  EXEC PGM=USERA
   //OUTDS1 OUTPUT CLASS=F,DEST=PRT003
   //DD1    DD SUBSYS=(AOP1,'anyafpprinter'),OUTPUT=(*.OUTDS1)
   ```

Chapter 5. Printing Using the AOPPRINT JCL Procedure

The AOPPRINT Job Control Language (JCL) procedure, provided in SYS1.PROCLIB, lets you submit print requests from z/OS. This procedure allows you to take advantage of all the features of Infoprint Server and Infoprint Server Transforms (5697-F51), including:

- You can specify job attributes.
- If the Infoprint Server Transforms are installed, you can automatically transform jobs from one data format to another.
- Infoprint Server validates that data set can print on the selected printer.

Notes:

1. Your administrator can customize the AOPPRINT procedure. For information, refer to *z/OS Infoprint Server Customization*.
2. For information about the JOB, EXEC, DD, and IF/THEN/ELSE/ENDIF JCL statements, which appear in the examples in this chapter, refer to *z/OS MVS JCL Reference*.

Sending a File to an E-mail Destination

With the AOPPRINT procedure, you can send the file to an e-mail destination instead of to a printer. When you send a file to an e-mail destination, your administrator can specify the e-mail address list of the recipients in the printer definition for the e-mail destination in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see “Specifying the E-mail Address List in an Alias File” on page 110.

The e-mail has the following characteristics:

- The file is an e-mail attachment. The name of the attachment is the name specified in the **sysout-dataset-name** job attribute. If this attribute is not specified, the attachment name is DD#SYSIN.

  The attachment name contains an extension that indicates the type of data in the file. For example, `txt` indicates text format, and `pdf` indicates PDF format.
- The subject of the e-mail is the value specified in the **title-text** job attribute or the default title your administrator specified in the Allocation section of the printer definition. If none is specified, the user ID of the user who ran the job is used.
- The sender is the user ID of the user who ran the job at the domain name of the z/OS system.
- You can receive replies from the e-mail unless a firewall prevents the z/OS system from receiving replies from the sending system. To receive replies, use the z/OS UNIX **mail** or **mailx** command. To use these commands, your ID must be a valid z/OS UNIX user ID.

AOPPRINT Parameters

```
ERRCLASS=class
OPTIONS='attribute=value'...
OUTCLASS=class
PRINTER=printer_definition_name
```

Figure 14. AOPPRINT JCL Parameters: Format

ERRCLASS=*class*
Specifies the 1 character alphanumeric name of the system output data set (sysout) class for error messages. The name of the data set where error messages are written is specified by the STDERR data definition name (DDname).

Default: Infoprint Server uses the class specified by your administrator.

OPTIONS='*attribute=value* **...'**
Specifies job attributes and values to use in processing the job. For descriptions of all job attributes, see "Attribute Listing" on page 85. Enter the attribute names in lower case; separate attributes with a space.

Using an attributes file: You can store attributes and values in a UNIX file (such as an HFS file) or in an MVS data set. Use the attribute called **attributes** to specify the file or DD name from which attributes are to be read, as in this example:

```
OPTIONS='attributes=bigjob.att'
```

If the attributes are stored in an MVS data set, you must specify four single quotation marks before the data set name and four single quotation marks after it.

See "Creating an Attributes File" on page 84 for how to create an attributes file.

OUTCLASS=*class*
Specifies the 1 character alphanumeric name of the sysout class for informational messages. The name of the data set where informational messages are written is specified by the STDOUT DDname.

Default: Infoprint Server uses the class specified by your administrator.

PRINTER=*printer_definition_name*
Specifies the name of a printer definition created by your administrator. The printer definition identifies a printer or an e-mail destination and sets default values for transform options and for some job attributes. The name of the printer definition is case-sensitive. Enter it exactly as your administrator tells you.

Default: Infoprint Server uses the default printer definition specified by your administrator.

AOPPRINT DD Statements

The AOPPRINT JCL procedure lets you specify the following DD statements. Notice that you cannot specify an OUTPUT statement; if you specify one, it is ignored.

STDERR
Specifies the system output data set where error messages are to be written. The ERRCLASS parameter defines the class of this data set.

STDOUT
Specifies the system output data set where informational messages are to be written. The OUTCLASS parameter defines the class of this data set.

SYSIN
Specifies the data set to be printed. You can concatenate data sets that have the same data format, for example line data or AFP data; however, you *cannot* concatenate data sets that contain PDF data.

AOPPRINT Results

After Infoprint Server accepts the print job, AOPPRINT returns an Infoprint Server job ID, which you can use to query and cancel the job. The Infoprint Server job ID is returned in a message in the STDOUT data set, for example:

```
AOP007I Job 14584 successfully spooled to myprinter.
```

The Infoprint Server job ID can help the system operator find your job on the JES spool. The job ID field of the data set that Infoprint Server allocates on the JES spool contains the same Infoprint Server job ID. The Infoprint Server job ID is different, however, from the z/OS job ID, which is a unique job ID that z/OS assigns to the data set. JES operator commands return the z/OS job ID.

AOPPRINT Examples

The following examples show how to use the AOPPRINT JCL procedure.

Print a File on the Default Printer

This example shows how to submit the data set `FILE1.LISTPS` to your default printer:

```
//JOB1   JOB  707,JONES
//PRINT  EXEC AOPPRINT
//SYSIN  DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Print a File on a Specified Printer

This example shows how to submit the data set `FILE1.LISTPS` to the printer `fred`:

```
//JOB2     JOB  D31,'H. EVANS'
//PRINTPS  EXEC AOPPRINT,PRINTER='fred'
//SYSIN    DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Print Multiple Copies of a Data Set

This example shows how to submit a data set to the default printer and specify two copies of the job:

```
//JOB3    JOB  ,'MARTHA'
//PRINT2  EXEC AOPPRINT,OPTIONS='copies=2'
//SYSIN   DD   DSNAME=MYJOB.PDF,DISP=SHR
```

Note: VTAM-controlled printers and some IPP-enabled printers do not support printing more than one copy. In this case, only one copy prints.

Submit and Hold a Job

This example shows how to submit the data set FILE1.LISTPS to Printer1 and to hold it so that it does not print until the operator releases it:

```
//JOB5    JOB  (DIV1,GROUP7),OPERATOR
//PRHOLD  EXEC AOPPRINT,PRINTER='Printer1',OPTIONS='hold=true'
//SYSIN   DD   DSNAME=FILE1.LISTPS,DISP=SHR
```

Specify a Code Page for ASCII Jobs

This example shows how to print the data sets JAN.REPORT and FEB.REPORT on the default printer and to specify the code page ISO8859-1:

```
//JOB6   JOB  (DIV1,GROUP7),'ANNE BROWN'
//PRINT  EXEC AOPPRINT,OPTIONS='document-codepage=ISO8859-1'
//SYSIN  DD   DSNAME=JAN.REPORT,DISP=SHR
//       DD   DSNAME=FEB.REPORT,DISP=SHR
```

Print with Error Processing

This example shows how to print the data set BIGJOB.PCL on Printer1, writing error messages to the data set BIGJOB.PCL. This example calls one program if the job succeeds, or a different program if it fails.

```
//JOB8      JOB  ,'MARTHA'
//PRINTERR  EXEC AOPPRINT,PRINTER='Printer1'
//SYSIN     DD   DSNAME=BIGJOB.PCL,DISP=SHR
//STDERR    DD   DSNAME=BIGJOB.ERR
//*
//          IF   PRINT.LP.RC ¬= 0 THEN
//FAIL      EXEC PGM=BADJOB
//          ELSE
//SUCCEED   EXEC PGM=GOODJOB
//          ENDIF
```

Print In-Stream Data

This example shows how to print data from the JCL input stream:

```
//JOB9   JOB  D10,CHARLIE
//HELLO  EXEC AOPPRINT
//SYSIN  DD   *
         Hello, world!
/*
```

Send a File to an E-mail Destination

This example shows how to send data set FILE1.AFP to the e-mail address list specified in printer definition deptmail, and specify a subject for the e-mail, a name for the e-mail attachment, and a form definition to be used when the AFP file is transformed to PDF format:

```
//JOBA     JOB  D31,'H. EVANS'
//EMAIL    EXEC AOPPRINT,PRINTER='deptmail',
//     OPTIONS='attributes=//DD:MYATTR'
//SYSIN    DD   DSNAME=FILE1.AFP,DISP=SHR
//MYATTR   DD   *
sysout-dataset-name=Report
title-text="Monthly Report"
form-definition=F1MYDEF
/*
```

Note: In this example, the EXEC statement continues on a second line because a single line would be longer than 71 characters. When you continue a JCL statement, observe these rules:

1. Break after a complete parameter or subparameter, at or before column 71. A comma belongs with the preceding parameter or subparameter.
2. Code // in columns 1 and 2 of the continuation line.
3. Leave column 3 of the continuation line blank.
4. Continue the interrupted parameter or field starting in any column from 4 through 16.

This example assumes that the AFP to PDF transform is specified in printer definition `deptmail` and that AFP resources libraries are specified either in the printer definition or in the transform configuration file, **aopxfd.conf**. If the AFP resource libraries are not specified elsewhere, specify the libraries in the **resource-library** job attribute.

Results: The recipients listed in printer definition `deptmail` receive an e-mail:

- The sender of the e-mail is the user ID of the user who ran the AOPPRINT procedure.
- The subject of the e-mail is `Monthly Report`.
- File `FILE1.AFP` is attached to the e-mail. The name of the attachment is: `REPORT`. The file is in PDF format and can be viewed and printed with a PDF viewer such as Adobe Acrobat Reader.

AOPPRINT Exit Values

0 Infoprint Server accepted the request.

>0 An error occurred.

Chapter 6. Transforming Data With the AOPBATCH Program

The AOPBATCH program, provided by Infoprint Server in SYS1.LINKLIB, lets you submit a batch job to transform data to and from the Advanced Function Presentation (AFP) data format, using transforms provided by the Infoprint Server Transforms product (5697-F51).

AOPBATCH Parameters

The AOPBATCH parameters are the name of the transform command, followed by transform options and arguments, in the following format:

```
EXEC PGM=AOPBATCH,PARM='/transform_name transform_options'
```

/ The optional slash indicates that the PARM data that follows is input to AOPBATCH. If you omit the initial slash, your PARM data might be interpreted as C++ run-time options. You *must* include the initial slash if any of the PARM data itself includes a slash. For example, if the transform name is `/mylib/ps2afp`, specify: `PARM='//mylib/ps2afp ...'`.

transform_name
The name of an executable transform program that resides in an HFS file. The name of the transform program is case sensitive. You can specify one of the following transform command names provided by Infoprint Server Transforms: **afp2pcl, afp2pdf, afp2ps, pcl2afp, pdf2afp, ps2afp**, and **sap2afp**.

If the transform program does not reside in one of the directories specified in the PATH environment variable, also specify the pathname. You can use the STDENV DD statement to set the PATH environment variable if the default value set by AOPBATCH is not suitable. See “AOPBATCH DD Statements” on page 158 for information about the defaults set for environment variables.

transform_options
Options and arguments accepted by transform. For a description of the transform command options and arguments, see the transform description in Chapter 2, “Printing from z/OS UNIX System Services Using Infoprint Server Commands” on page 23.

You must specify the transform input data set or file as a transform argument, and you must specify the **-o** transform option to identify where you want the transform to write its output. (This is because the transform cannot write its output to standard output and cannot read input from standard input.) To identify the transform input and output data set or file, you can specify either a DD statement name or a data set or file name. You must specify a DD statement name if you want to write the transform output to an MVS data set that does not already exist.

Specify the names of DD statements to the transform in the following format:

```
//DD:DDname
```

where *DDname* is the name of the DD statement.

When you specify an MVS data set name in the **-o** options, code two slashes before the data set name and enclose the data set name in two sets of single quotes if you specify a fully qualified data set name. If you do *not* enclose the data set name in quotes, then C/C++ assumes that the data set name is not fully qualified and adds a high-level qualifier to the name you specify, as follows:

- If you are running under TSO (batch or interactive), OS/390 C/C++ appends the TSO user prefix.
- If you are running under MVS batch or IMS (batch or online), OS/390 C/C++ appends the RACF user ID.
- If your system does not use RACF, C/C++ does not add a high-level qualifier.

See "AOPBATCH Examples" on page 159 for examples of different ways to specify transform input and output data sets and files.

AOPBATCH DD Statements

The AOPBATCH JCL procedure accepts the following standard DD statements:

STDENV

Specifies environment variables for use by the transform. You can specify the environment variables in-stream in the JCL, in an MVS data set, or in a UNIX file. Specify the environment variables in the format *variable*=*value*, with one environment variable per line or record. Sequence numbers in columns 73 - 80 in data specified with the STDENV DD statement are ignored and *not* treated as part of the data.

If you omit the STDENV DD statement or do not specify one of the following environment variables, AOPBATCH sets the following default values, which are suitable for running Infoprint Server programs if your installation installed Infoprint Server files in the default directories:

- PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
- LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
- NLSPATH=/usr/lpp/Printsrv/%L/%N:/usr/lib/nls/msg/%L/%N

AOPBATCH also sets the HOME environment variable to the user's home directory and sets the LOGIN variable to the user ID.

Note: Do *not* specify the _BPX_SHAREAS environment variable. AOPBATCH will set it appropriately.

STDERR

Specifies the system output data set where error messages are to be written. The data set can be an MVS data set or a UNIX file.

STDOUT

Specifies the system output data set where informational messages are to be written. The data set can be an MVS data set or a UNIX file.

You can also include DD statements to specify MVS data sets that contain input data to be transformed, the transformed output, or job attributes that are input to the transform. Do *not* use DD names STDIN, STDOUT, or STDERR to specify the transform input and output data sets. Instead, use other DD names, such as INPUT and OUTPUT, which are used in the examples.

Rules:

- If the output data set is an MVS data set, the following requirements apply:
  - You must either allocate and catalog the data set before you run AOPBATCH, or include a DD statement in the AOPBATCH job to allocate the data set.
  - The MVS output data set must be large enough to hold the output data stream. The size of the output data stream depends on the complexity of the document; if you run the **pcl2afp**, **pdf2afp**, or **ps2afp** transform, the type of

image compression you select in the **-a** option also affects the size of the output data stream. Typically, an output AFP data stream is several times as large as the input data stream.

  – If the output data set is to contain an AFP data stream, allocate a data set with the following characteristics:
    - Record format: VBM
    - Record length: 8192 (8K) or larger
  – If the output data set is to contain a PCL, PDF, or PostScript data stream, allocate a data set with the following characteristics:
    - Record format: VB
    - Record length: 1024 or larger is recommended
  – Specify a disposition of SHR or OLD if you want the transform to overwrite any existing data; otherwise, specify a disposition of MOD to append the output to any existing data. If you do not specify any disposition, the transform overwrites any existing data.
- If you have not added the Language Environment run-time library (CEE.SCEERUN) or the C++ run-time library (CBC.SCLBDLL) to the system LNKLST, specify these data sets in a STEPLIB DD statement.
- You can concatenate input data sets that have the same data format, for example PostScript data or AFP data; however, you *cannot* concatenate data sets that contain PDF data.

AOPBATCH Examples

The following examples show how to use the AOPBATCH procedure to transform data.

Specify Transform Input and Output in MVS Data Sets, and Specify Environment Variables

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to an MVS data set. Transform **ps2afp** reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP. HLQ represents the high-level qualifier, for example, your TSO or RACF user ID.

This example also shows how to specify environment variables in-stream in the STDENV DD statement. If you installed Infoprint Server and created Infoprint Server configuration files in default directories, you do *not* need to specify these environment variables and you can omit the STDENV DD statement.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT    DD   DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
//              DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
//              SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//STDENV   DD   *
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/%L/%N:/usr/lib/nls/msg/%L/%N
AOPCONF=/etc/Printsrv/aopd.conf
/*
```

Specify Transform Input in a UNIX File and Output in an MVS Data Set

This example shows how to transform data when the transform input is in a UNIX file and transform output is written to an MVS data set. The **pdf2afp** transform reads the PDF input from file **/tmp/input.pdf** and writes AFP output to HLQ.OUTPUT.AFP.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/pdf2afp -o //DD:OUTPUT /tmp/input.pdf'
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
```

Specify Transform Input in an MVS Data Set and Output in a UNIX File

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to a UNIX file. Transform **afp2pdf** reads the AFP input from data set HLQ.INPUT.AFP and writes PDF output to file **/tmp/output.pdf**.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,
// PARM='/afp2pdf -o /tmp/output.pdf "//''HLQ.INPUT.AFP''"'
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
```

Transform and Print Data Sets

This example shows how to transform data and print the output from the transform in a subsequent step.

In the first step, transform **ps2afp** reads PostScript input from MVS data set HLQ.INPUT.PS and writes AFP output to MVS data set HLQ.OUTPUT.AFP, where HLQ represents the high-level qualifier, for example, your TSO or RACF user ID.

In the second step, the AOPPRINT JCL procedure is used to print the output from the transform to the printer named `myprinter`, which is defined in the Printer Inventory. See Chapter 5, “Printing Using the AOPPRINT JCL Procedure” on page 151 for more information about AOPPRINT.

```
//AOPBATCH JOB  ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT    DD   DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT   DD   DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
//              DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
//              SPACE=(CYL,(1,1))
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//PRINT    EXEC AOPPRINT,PRINTER='myprinter'
//SYSIN    DD   DSN=HLQ.OUTPUT.AFP,DISP=SHR
```

Exit Values

AOPBATCH returns the exit code of the spawned process. If AOPBATCH cannot execute the program, it returns 4.

Chapter 7. Printing from VTAM Applications

The NetSpool component of Infoprint Server lets you print jobs from Virtual Telecommunications Access Method (VTAM) applications, such as Customer Information Control System (CICS) or Information Management System (IMS), without changing the applications. In order to use NetSpool effectively, you should understand:

- The data streams that NetSpool supports, including transparent data
- Differences between printing with NetSpool and printing on Systems Network Architecture (SNA) printers
- End-of-file processing in NetSpool
- Page formatting in NetSpool
- E-mail support

Data-Stream Support

NetSpool accepts the following types of VTAM data streams:

- SNA character string (SCS) data over a logical unit (LU) type 1 session.
- 3270 data over an LU type 3 or LU type 0 session.
- Any printable data. For this type of data, your administrator must select the NetSpool **None** formatting option in the Printer Inventory.

NetSpool converts the data stream that it receives as input into one of the following types of output data streams, according to the type of NetSpool formatting the administrator has selected in the printer definition in the Printer Inventory:

- Line data stream: If the administrator selects the **Convert to line** formatting option, NetSpool creates EBCDIC variable-length records, each record starting with an American Standards Association (ASA) carriage-control character.
- PCL data stream: If the administrator selects the **Convert to PCL** formatting option, NetSpool creates an ASCII text data stream with embedded PCL commands.
- Binary data stream: If the administrator selects the **None** formatting option, NetSpool creates variable-length records without converting or translating any controls or data.

NetSpool uses default page-formatting values defined by the administrator if the SCS data stream does not contain Set Horizontal Format or Set Vertical Format commands.

The following sections and publications describe SCS and 3270 data streams in more detail:

- Appendix C, “NetSpool Support for SCS Code Points” on page 193 describes the code points that NetSpool supports for the SCS data stream.
- Appendix D, “NetSpool Support for 3270 Data Streams Code Points” on page 203 describes the code points that NetSpool supports for the 3270 data stream.
- *SNA—Sessions Between Logical Units* describes the SCS data stream.
- *3270 Information Display System Data Stream Programmer’s Reference* describes the 3270 data stream.
- *IBM 3270 Kanji Data Streams* describes double-byte character set (DBCS) SCS and 3270 data streams.

Transparent Data Support (SCS Data Stream)

The Transparent (TRN) control in SCS data streams identifies the start of a transparent data stream. NetSpool supports transparent data by including TRN controls and transparent data in line data output. NetSpool increases the output column and line position by the number of bytes of transparent data, as specified in a TRN control.

NetSpool provides two installation exits that let the administrator customize the processing of transparent data for all or selected printer names:

- The Beginning of File exit (APIPPTD1) adds transparent data to the beginning of a data set.
- The Transparent Data Control exit (APIPPTD2) inspects, changes, or deletes transparent data whenever it occurs in the data stream.

Double-Byte Character Set (DBCS) Support

NetSpool supports DBCS data in both SCS and 3270 data streams when it converts data streams to line data. NetSpool does *not* support DBCS data when it converts data streams to PCL data.

In an SCS data stream, NetSpool supports the following controls, which identify DBCS strings:

- Shift Out and Shift In controls
- Set Attribute controls, with the Character Set attribute

In a 3270 data stream, NetSpool supports the following controls and orders, which identify DBCS strings:

- Shift Out and Shift In controls
- Set Attribute (SA) orders, with the Character Set attribute
- Start Field Extended (SFE) orders with the Character Set attribute
- Modify Field (MF) orders with the Character Set attribute

In place of these controls and orders, NetSpool inserts Shift Out and Shift In line-data controls where necessary in line data output.

Note: To prevent unwanted blanks in DBCS output, specify the PRMODE=SOSI2 parameter on the OUTPUT JCL statement that NetSpool uses to allocate data sets for the printer name.

Binary Data Support

The administrator can create a printer definition that specifies that NetSpool should treat input data as binary data. NetSpool writes binary data to the output data set, in variable length records, without examining or converting the data stream.

The administrator can specify the record size and record format (VB, VBA, or VBM) to use in outputting binary data to the spool.

NetSpool does not process TRN controls in binary data.

Data-Stream Restrictions

For SCS data streams, NetSpool does *not* support the following codes:

- Function Management (FM) headers

NetSpool cannot handle FM headers because it does not expect FM data requests that it receives to be formatted. NetSpool rejects any request that contains an FM header with an SNA sense code of function error (X'10030000'), indicating an unsupported function.

- Some SCS commands.

  For more information, see Appendix C, “NetSpool Support for SCS Code Points” on page 193.

For 3270 data streams, NetSpool supports only the following codes:

- Orders in the basic function set, as described in *SNA—Sessions Between Logical Units*
- Shift Out and Shift In controls
- Set Attribute (SA), Set Field Extended (SFE), and Modify Field (MF) orders, with the Character Set attribute. NetSpool ignores other attributes of the SA, SFE, and MF orders. For more information, see Appendix D, “NetSpool Support for 3270 Data Streams Code Points” on page 203.

NetSpool rejects other orders in a 3270 data stream with an SNA sense code of function error (X'10030000'), indicating an unsupported function. Note that the Write Structured Fields (WSF) order is not included in the basic function set and, therefore, is not supported.

NetSpool does not reject unsupported commands or orders in binary data.

Data Encryption and Compression

Encrypted or compressed data sent to NetSpool are decrypted and decompressed as they arrive at the z/OS system where NetSpool is running. The data remain unencrypted and uncompressed during processing and after placement on the job entry subsystem (JES) spool.

Differences from SNA Network Printing

You may notice differences in the following areas when sending output from VTAM application programs to NetSpool instead of to an SNA network printer:

- Notification of printing

  When you send output to an SNA network printer, a positive response from the printer means that the data has been printed successfully. However, when you send output to NetSpool, a positive response from NetSpool means only that NetSpool has successfully created a JES output data set.

- Data-set printing

  An SNA-network printer prints each VTAM print request separately. However, NetSpool combines several print requests into one output data set. In the printer definition for each printer in the Printer Inventory, the administrator can select the criteria that NetSpool uses when it combines print requests into one output data set.

- Deferred printing

  When you print output on an SNA network printer, each print request is printed immediately. However, JES or the system operator may defer the printing of data sets that are created by NetSpool until system resources are available.

- Printer sharing

  Because an SNA network printer usually has a session limit of 1, your output is usually the only output that is printed on that printer. However, because JES

supports printer sharing, data sets from other users may be printed on the same printer. An installation can print distribution information on the header pages to aid in distributing output.

End-of-File Processing

Printing in a JES environment requires that NetSpool keep all related print data together in an output data set on the JES spool. This ensures that related print data is printed in the correct order and is not interleaved with other output.

For printing in the SNA network, the concept of a data set is not necessary. An application starting a session with a printer gains exclusive control of that printer for the duration of the session. Therefore, data always prints in the correct order and is not interleaved with any other application's print output.

In contrast, when you print in a JES environment, the sending application is not guaranteed exclusive control of the printer. Between two successive data sets from one application, nothing prevents the printing of data sets from other applications. If the first attempt to print a data set fails, and a later retry succeeds, two successive data sets from the same application could even be printed in reverse order. Therefore, to guarantee that data belonging together gets printed in the correct order, without other data between sets, NetSpool batches that data into one data set.

Thus, for printing in a JES environment, NetSpool must determine where one data set should end and the next one should begin. NetSpool receives print data from VTAM applications as a stream of request units (RUs). The SNA architecture defines two groupings of RUs that are of interest:

- A *chain* consists of one or more RUs.
- A *bracket* consists of all of the RUs in one or more related chains.

To assist in determining when end-of-file occurs, NetSpool provides the following end-of-file rules for defining data sets:

- End-of-bracket (the default rule)
- End-of-session
- End-of-chain
- End-of-file indicated by a specified string of data in the file's last end-of-chain request
- End-of-file indicated by the expiration of a timer

The administrator can specify which end-of-file rule to use in the printer definition for each printer in the Printer Inventory. If NetSpool does not correctly determine the end of your data sets, ask the administrator to specify another end-of-file rule.

Page Formatting for SCS Data Streams

In some cases, SCS data streams used in LU type 1 sessions depend on a page format that has been preset for the SNA network printer. To simulate this page format, NetSpool lets the administrator specify page-formatting values in the Printer Inventory. The administrator can specify default values for line length, page length, margins, and tabs. If the administrator does not specify a default page-formatting value, then NetSpool uses hard-coded default page-formatting values.

If the print data stream contains the SCS commands Set Horizontal Format (SHF) and Set Vertical Format (SVF), the page-formatting values in these commands take effect immediately and remain in effect for all following print data sets on the same session. If no SHF or SVF command occurs in the print data stream, NetSpool uses the default page-formatting values. For more information about the SCS SHF and SVF commands, see Appendix C, “NetSpool Support for SCS Code Points” on page 193.

Following are the page-formatting values:

MPP=*linelength* **| 80**
: Specifies the maximum presentation position, that is, the line length. Specify zero or any integer from 1 through 255, inclusive. Zero, the default, uses the device line length, which NetSpool implements as 80 columns.

LM=*leftmargin* **| 1**
: Specifies where the left margin starts. Specify zero or any integer from 1 through MPP, inclusive. Zero, the default, uses the architectural default of column 1.

RM=*rightmargin* **| 0**
: Specifies where the right margin starts. Specify zero or a number from the left margin (LM) to the line length (MPP), inclusive. Zero, the default, uses the architectural default of the MPP value.

HT=(*tab1,tab2 ...)* **| 0**
: Specifies positions of horizontal tabs. The first tab is always the same as the left margin (LM) value and does not need to be specified. Each tab can be zero or greater than or equal to LM, or less than RM. Zero, the default, is valid and ignored. The application data stream can add additional tab stops but cannot remove default tab stops.

MPL=*pagelength* **| 1**
: Specifies the number of the maximum presentation line, that is, the maximum number of lines to be printed on the page. Specify zero or any integer from 1 through 255, inclusive. Zero, the default, uses the architectural default of 1 line.

TM=*topmargin* **| 1**
: Specifies where the top margin (also channel 1) starts. The top margin is also used as the line number for Select Vertical Channel 1. Specify zero or any integer from 1 through the page length (MPL), inclusive. Zero, the default, uses the architectural default of line 1.

BM=*bottommargin* **| 0**
: Specifies where the bottom margin starts. Specify zero or any integer from top margin (TM), which is also channel 1, to the page length (MPL), inclusive. Zero, the default, uses the architectural default of MPL. A bottom margin of 1 suppresses automatic form feed when the application spaces past the bottom margin.

VT=(*tab1,tab2, ...***) | 0**
: Identifies the position of vertical tabs (also channels 2–12). The first tab is always the same as the top margin value (TM) and does not need to be specified. The first 11 vertical tabs are also used as the line numbers for Select Vertical Channel 2 through 12. Each tab must be either zero or greater than or equal to top margin (TM), which is also Channel 1, and less than or equal to the bottom margin (BM), inclusive. Zero, the default, is valid and ignored. The application data stream can add additional tab stops but cannot remove default tab stops.

If the default page-formatting values are not appropriate for all target printers, the administrator must define appropriate values in one or more printer definitions in the Printer Inventory.

Notes:

1. In the ISPF panels that the administrator uses to create a printer definition, the fields for setting SCS page-formatting values are under the heading **SCS Conversion**.
2. The SCS page-formatting values in the printer definition do *not* apply when NetSpool formats 3270 input data. Instead, when NetSpool formats 3270 data, it uses page-formatting information that is specified in the 3270 data stream, in the Write Control Character (WCC).
3. When the administrator selects the NetSpool **Convert to PCL** formatting option, the administrator can also specify page orientation (portrait and landscape), page density, and line density values for both SCS and 3270 data streams in the Printer Inventory. For SCS data streams only, the administrator can also request that NetSpool automatically determine the appropriate page orientation on a page-by-page basis. In the ISPF panels, the fields for setting these page-formatting values are under the heading **NetSpool PCL Conversion**.

Sending Output to an E-mail Destination

You can send VTAM application output to an e-mail destination instead of to a printer, or you can send output to *both* an e-mail destination and to a printer. Your administrator can specify the e-mail address list of the recipients in the printer definition for the e-mail destination in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail. For more information, see “Specifying the E-mail Address List in an Alias File” on page 110.

The e-mail has the following characteristics:

- Each output data set is an e-mail attachment in a separate e-mail. The name of the attachment is the PLU name of the VTAM application that created the output, with an extension that indicates the type of data in the file. For example, `txt` indicates text format data, and `pdf` indicates PDF data.
- The subject of the e-mail is the value specified for the title in the printer definition or, if none is specified, the member name of the NetSpool startup procedure.
- The sender is the user ID of the user who started NetSpool at the domain of the z/OS system. E-mail recipients should not reply to this user ID.

Chapter 8. Printing from Windows Systems

With Infoprint Server, you can print from your Windows 95, Windows 98, Windows NT, Windows 2000, Windows XP, and Windows Millennium Edition (Me) system to any printer defined in the Infoprint Server Printer Inventory.

You can use the following methods to submit a print request:

- Any Windows application that supports printing, such as a word processor or a viewer application
- Windows **print** command (available on Windows NT, 2000, and XP)
- Windows LPR command (available on Windows NT, 2000, and XP)

The following table summarizes the tasks related to submitting a print request and refers you to the section that describes the task. Required tasks are required by all users; optional tasks are required only if the listed condition applies.

Task	Condition	See Page:
Determining the Print Submission Protocol	Optional: To print from a Windows application or with the **print** command	167
Installing Infoprint Port Monitor for Windows	Optional: To use the Infoprint Port Monitor	168
Adding a z/OS Printer to Your Windows System	Optional: To print from a Windows application or with the **print** command	169
Customizing the AFP Printer Driver	Optional: To use the AFP driver and change driver options	174
Sending a File to an E-mail Destination	Optional: To send files to an e-mail destination instead of to a printer	175
Printing Files	Required	175
Uninstalling the Infoprint Port Monitor for Windows	Optional: To remove the Infoprint Port Monitor	177

Determining the Print Submission Protocol

To print from a Windows application or with the **print** command, you must determine which protocol you want to use to submit your print request to Infoprint Server. Your administrator must customize Infoprint Server to use each of these protocols; therefore, consult your administrator to determine which protocols you can use in your installation.

- Infoprint Port Monitor: The Infoprint Port Monitor for Windows is a program that automatically directs files to Infoprint Server running on the z/OS system. The Infoprint Port Monitor runs on Windows 95, 98, NT, 2000, XP, and Me systems.
- Server Message Block (SMB) protocol: SMB is the standard printing protocol provided with Windows systems. Infoprint Server supports the SMB protocol on Windows 95, 98, NT, and 2000 systems.
- Internet Printing Protocol (IPP): IPP lets you print over the Internet from a Windows IPP client. Windows 2000 and Windows XP provide an IPP client.

These protocols support different print functions and have different limitations as summarized in Table 9.

Table 9. Comparison of Windows Printing Protocols

Function Supported	Infoprint Port Monitor	SMB	IPP
Specify job attributes during printing	Yes[1]	No	Yes[2]
Obtain print job status	No[3]	Yes[4]	No
Define a Windows shared printer	Yes	Yes	No

1. You can specify any job attributes described in Chapter 3, “Using Job Attributes” on page 83.
2. You can specify any IPP job attributes; however, Infoprint Server supports only the **copies**, **document-name**, and **priority** job attributes.
3. The Infoprint Port Monitor returns an error if Infoprint Server cannot accept the job. However, after Infoprint Server accepts a print job, it does not report any further status.
4. When the Windows job status window is open, z/OS system performance might be degraded.

Installing Infoprint Port Monitor for Windows

Note: The installation instructions in this chapter are current as of publication. If the product files are subsequently updated, the installation instructions may change. For the latest installation instructions, visit the IBM Printing Systems Division (PSD) Web site at: `http://www.ibm.com/printers/`

Before You Begin

Ensure that the following software requirements are met:

- Microsoft Windows 95, Windows 98, Windows NT (Version 4.0 or higher), Windows 2000, Windows XP, or Windows Me is required.
- Microsoft TCP/IP must be configured and operational.
- **Windows 95 systems:** The Windows Socket 2 update is required. You can download the update from the Microsoft Web site at:

`http://www.microsoft.com/windows95/downloads/contents/wuadmintools/s_wunetworkingtools/w95sockets2/`

- Microsoft Internet Explorer 3.x (or later) is required in order to view Port Monitor online help. You can download the Internet Explorer from the Microsoft Web site at: http://www.microsoft.com/ie/
- If you have Infoprint Manager Select installed on your Windows system, Infoprint Manager Select should be at the latest level.

Tip: If an earlier version of the Infoprint Port Monitor is installed on your Windows system, do *not* uninstall it before you install Infoprint Port Monitor Version 2.0.0. Infoprint Port Monitor Version 2.0.0 automatically replaces the previous version and also saves your Windows printers and your Infoprint port configuration. However, future updates to the Infoprint Port Monitor might require that you first uninstall the Infoprint Port Monitor. If so, documentation provided with the update will tell you the procedure to follow.

Steps to Install Infoprint Port Monitor for Windows

Follow these steps to install the Infoprint Port Monitor for Windows:

1. Download the Infoprint Port Monitor from one of the following locations:
   - Download the z/OS file: **/usr/lpp/Printsrv/win/En_US/aopwin.exe**

     Use a file transfer program, such as **ftp**, and download the file in binary. To do this, you need an account on the z/OS system where Infoprint Server is installed.
   - Download from the Web at: `http://www.ibm.com/printers/download.html`.

     If your Web browser is Microsoft Internet Explorer and you select to run or open the port monitor from its current location, the port monitor is automatically installed and you can skip the remaining steps.

   The following examples assume that you downloaded file **aopwin.exe** to Windows directory **c:\zostemp**.
2. If the Infoprint Port Monitor was not automatically installed in the previous step:
   a. Run **aopwin** to install the Infoprint Port Monitor. For example, type the following in the Run dialog box:

      ```
      c:\zostemp\aopwin
      ```

      The installation requires you to restart your Windows system.
   b. Delete file **aopwin.exe** from your workstation. For example, delete **c:\zostemp\aopwin.exe**

Result: You can now add one or more z/OS printers to your Windows system as local Windows printers. Follow the instructions in “Adding a Local Printer and Configuring the Infoprint Port Monitor for Windows” on page 170, or follow the more detailed instructions that are displayed after you install the Infoprint Port Monitor. A shortcut to the detailed instructions is placed on your Windows desktop during the install of the Infoprint Port Monitor.

When you upgrade the Infoprint Port Monitor to Version 2.0.0, your printers and Infoprint ports are saved. Therefore, you do not need to add the printers again or reconfigure the Infoprint ports. If you defined a Windows shared printer, you might want to select the **Unattended port** option, which was introduced in Infoprint Port Monitor Version 2.0.0. See “Steps to Reconfigure an Infoprint Port on Windows NT, Windows 2000, and Windows XP Systems” on page 172 for instructions.

Adding a z/OS Printer to Your Windows System

Before you can print to a z/OS printer, you must define the printer to your Windows system. Use one of these methods:

- If you are using SMB protocol for printing, refer to *z/OS Distributed File Service SMB Administration* for information about how to add a z/OS printer.
- If you are using the Infoprint Port Monitor for printing, add the printer to your Windows system as a local printer. However, if your Windows administrator has already defined the printer as a Windows shared printer, simply add the shared printer to your system as a Windows network printer.
- If you are using the IPP protocol for printing, define the printer as an Internet printer.

Adding a Local Printer and Configuring the Infoprint Port Monitor for Windows

Before You Begin

Before you add a printer, ask your Infoprint Server administrator for the following information:

- The host name or the Internet Protocol (IP) address of the z/OS system where Infoprint Server is running.
- The port number on the z/OS system at which Infoprint Server is listening. The port is usually 515.
- The name of the printer to use. This is the name your administrator used when the printer was defined to Infoprint Server.
- The name of the printer driver to use.

  The printer driver converts your documents to a format that the printer understands. This driver might be available online; or the Windows administrator might give it to you on a diskette or CD-ROM.

  The AFP Printer Driver converts your documents to AFP format for printing on IBM AFP printers. You can download the AFP Printer Driver, as well as other printer drivers, at no charge from the Web at `http://www.ibm.com/printers/download.html`.

  If either the PCL to AFP transform or the PostScript to AFP transform is installed on the z/OS system, you can use a PCL or PostScript driver instead of the AFP driver.
- If you plan to use the AFP driver, the model number and resolution of the AFP printer.

Steps to Add a Printer as a Local Printer

Use the Windows Add Printer Wizard to add a printer, and follow these special steps. These steps occur in different orders on different Windows systems.

1. When the **Add Printer Wizard** asks you to select a port:
   a. Add an Infoprint port. Add a separate Infoprint port, with a unique name, for each z/OS printer to which you want to print.

      Windows 95, 98, and Me systems: Select the predefined **Infoprint Port** port from the list of available ports.

      If you have already added a printer at the Infoprint port, select the Infoprint port but do *not* configure it as described in the next step. Instead, after you finish adding the printer, add another Infoprint port as described in “Steps to Add Another Infoprint Port on Windows 95/98 and Windows Me Systems” on page 171.

      Windows NT, 2000, and XP systems: For each printer, add a new Infoprint port and configure it. To add an Infoprint port within the Add Printer Wizard, click **Add Port**.

   b. Configure the Infoprint port.

      Windows 95, 98, and Me systems: After you select the Infoprint port, click **Configure Port** on the Add Printer Wizard dialog box.

      Windows NT, 2000, and XP systems: After you click **Add Port**, the Infoprint Port Configuration dialog box is displayed automatically.

      On the Infoprint Port Configuration dialog box:

      1) Type values in the **Host Name** and **Host Port** fields.
      2) Click **Refresh Printer Selection List**.
      3) Select the name of the printer from the list.

4) Click **Options** to display a screen where you can specify Infoprint Server job attributes. By default, these attributes apply to every job you send to this printer. On the Infoprint Server Options dialog box:
   - In the **Separator Sheet** box, fill in the information that you want to appear on the cover sheet printed before each job. Whether a field is printed depends on how your administrator has configured the separator sheet.
   - In the **Job Attributes** field, optionally specify any of the job attributes described in Chapter 3, “Using Job Attributes” on page 83. Separate attributes with spaces.

     Example: To specify a title for the separator page or a subject for an e-mail, and 2 copies of each printed document, enter:

     ```
     title-text="description of contents" copies=2
     ```
   - If you want to specify different attributes for some documents, select the **Prompt for attributes when printing** check box.

     Note: If you plan to define the printer as a Windows shared printer, do *not* select the **Prompt for attributes when printing** option because the Infoprint Server Options dialog box is displayed only on the Windows system where the Infoprint Port Monitor is installed.

5) Click **Unattended port** if other users might print to the printer at this port. If you select this option, the Infoprint Port Monitor does not present error messages in pop-up windows on this Windows system and wait for replies. (On Windows NT, Windows 2000, and Windows XP systems, error messages are displayed in the Windows Event Log on the user's system.)

6) Click **OK**.

2. When the **Add Printer Wizard** asks you to select a printer driver, follow these steps if you want to select the AFP Printer Driver:
   a. Select **Have Disk**.
   b. On the next panel, type the location of the Windows directory in which you installed the driver files, for example, **d:\afpdriver**, and click **OK**.
   c. Select the model number of the z/OS printer.

      If the model number is not on this list, select **IBM AFP** *nnn*, where *nnn* is the resolution of the printer. Then, change the printer characteristics as described in step 3, under “Customizing the AFP Printer Driver” on page 174.
3. **Windows NT, 2000, and XP systems:** When the **Add Printer Wizard** asks you whether or not you want to share the printer, select the **share** option if you want other users to share this Windows printer.

Steps to Add Another Infoprint Port on Windows 95/98 and Windows Me Systems

After you add a second z/OS printer to your Windows 95/98 and Windows Me systems, you must add another Infoprint port for the printer and configure the port.

1. Open the Printers folder.
2. In the Printer window, right-click the printer icon for the printer you just added. Then click **Properties**.
3. In the Properties notebook, click the **Details** tab.
4. In the Details tab, click **Add Port**.

5. In the Add Port window, click **Other** and select **Infoprint Port Monitor** as the type of port. Then click **OK**.
6. Type a name for the new port, for example `Infoprint-2`. Use a name that is not already used for any other port.
7. In the Infoprint Port Configuration dialog box, follow the instructions in the help for the dialog box. Then click **OK**.
8. Back in the Details tab, you will see the new port selected. Click **Apply**.
9. Click the **General** tab. Optionally click **Print Test Page**. Then click **OK**.

Steps to Reconfigure an Infoprint Port on Windows 95/98 and Windows Me Systems

You must reconfigure the Infoprint port if you want to print to a different printer, change separator sheet information, or change Infoprint Server job attributes.

1. Open the Printers folder.
2. In the Printer window, right-click the printer icon for the printer whose port you want to reconfigure. Then click **Properties**.
3. In the Properties notebook, click the **Details** tab.
4. In the Details tab, click **Port Settings**.
5. In the Infoprint Port Configuration dialog box:
   a. Click **Options** if you want to change information for the printer's separator sheet or job attributes.
   b. Verify that values in the **Host Name** and **Host Port** fields are correct.
   c. To select a new printer, click **Refresh Printer Selection List** and select the name of the printer from the list.
   d. Do *not* select the **Unattended port** option. This option only is useful for printers defined as Windows shared printers on Windows NT, Windows 2000, and Windows XP systems.
   e. Click **OK**.
6. In the Details tab of the Properties window, click **OK**.

Steps to Reconfigure an Infoprint Port on Windows NT, Windows 2000, and Windows XP Systems

You must reconfigure the Infoprint port if you want to print to a different printer, change separator sheet information, change Infoprint Server job attributes, or change the setting of the **Unattended port** option.

1. Open the Printers folder or the Printers and Faxes folder.
2. In the Printer window, right-click the printer icon for the printer whose port you want to reconfigure. Then click **Properties**.
3. In the Properties notebook, click the **Port** tab.
4. In the Ports tab, click **Configure Port**.
5. In the Infoprint Port Configuration dialog box:
   a. Click **Options** if you want to change information for the printer's separator sheet or job attributes.
   b. Verify that values in the **Host Name** and **Host Port** fields are correct.
   c. To select a new printer, click **Refresh Printer Selection List** and select the name of the printer from the list.
   d. Select **Unattended port** if other users might print to the printer at this port. If you select this option, the Infoprint Port Monitor does not present error

messages in pop-up windows on this Windows system and wait for replies. (Error messages are always displayed in the Windows Event Log on the user's system.)

e. Click **OK**.

6. In the Ports tab of the Properties window, click **OK**.

Adding a Network Printer

If your Windows administrator has defined the z/OS printer as a shared printer in your Windows network, follow these steps:

1. Ask your Windows administrator for the name that he or she has assigned to the printer.
2. Follow standard Windows procedures to add the z/OS printer as a network printer.

Note: If the Windows administrator defines a printer as shared, individual users cannot be prompted for attributes when printing.

Adding an Internet Printer

Before You Begin

Ask your Infoprint Server administrator for the following information:

- The Uniform Resource Identifier (URI) of the printer.

  The URI of a printer defined in the Printer Inventory has the following format:

  http://*host*:*port*/servlet/IPPServlet/*printername*

  where:

  host The host name or IP address of the z/OS system.

  port The port number where the IPP server is listening. By default, the IPP server listens at port 631. Ask your administrator the port number to use.

  printer_definition_name
  The name of the printer definition in the Printer Inventory.

  For example:

  ```
  http://myzoshost:631/servlet/IPPServlet/myprinter
  ```

  Be careful to note the exact spelling of the URI. Upper and lower case letters are *not* equivalent.
- The manufacturer and model number of the printer.
- The name of the printer driver to use.

  The printer driver converts your documents to a format that the printer understands. This driver may be available online; or your administrator may give it to you on a diskette or CD-ROM.

  The AFP Printer Driver converts your documents to AFP format, which lets you print to IBM AFP printers. You can download the AFP Printer Driver at no charge from the Web at `http://www.ibm.com/printers/download.html`. If you want to use the AFP driver, you need to know the model number and resolution of the AFP printer.

  If either the PCL to AFP transform or the PostScript to AFP transform is installed on the z/OS system, you can use a PCL or PostScript driver instead of the AFP driver.

Steps to Define a Printer as an Internet Printer on Windows 2000 and Windows XP Systems

Use the standard Windows procedure to add a printer, and follow these special steps:

1. When the **Add Printer Wizard** asks you whether to install the printer as a local printer or a network printer, select **Network printer**. On Windows XP, select **A network printer, or a printer attached to another computer**.
2. When the **Add Printer Wizard** asks you how to connect, select **Connect to a printer on the Internet ...**. Enter the URI of the printer in the **URL** field.
3. When the **Add Printer Wizard** asks you whether to install the printer driver, select **OK**.

   While Windows is installing the printer driver, the **Add Printer Wizard** returns to the screen where you entered the URI. For some time, it may seem that nothing is happening. Do *not* cancel the job. Wait for the **Add Printer Wizard** to go on to the next screen.

Customizing the AFP Printer Driver

The AFP Printer Driver for Windows, which you can download from `http://www.ibm.com/printers/download.html`, creates AFP output for printing on IBM AFP printers. If you use the AFP Printer Driver, you can optionally change default printing options and specify printer characteristics.

Follow these steps to configure the AFP Printer Driver:

1. In the Windows **Printer** directory, highlight the icon for the printer.
2. Do one of the following, depending on your Windows system:
   - In Windows 95 or Windows 98, from the File menu, select **Properties**. Then select the **Paper** and **Options** tabs of the notebook.
   - In Windows NT or Windows 2000, from the File menu, select **Document Defaults** and **Properties**.
3. Specify the default printing options and printer characteristics. To specify the following printing options, select **Inline Form Definition** from either the **Options** tab (Windows 95 or 98) or from the **Document Defaults** dialog box (Windows NT or 2000):
   - Duplex printing (printing on 2 sides of the paper)
   - Printing of an overlay (electronic form)
   - Paper source on the printer (input tray)

   For faster printing of large files, consider turning on the **Use substitution table** option (Windows 95 or 98) or turning off the **Print text as graphics** option (Windows NT or 2000). This causes the driver to create a smaller output file. First, ensure that your printer can perform font substitution. Also, note that if you use True-Type fonts, the document may not print with exact fidelity. For better resolution, you can try changing the **Output Fidelity** options on the driver.

   Usually, the printer characteristics, such as whether or not the printer can perform font substitution and handle compressed images, and the supported clip limits, are already set correctly. However, if the name of the AFP Printer Driver is **IBM AFP** *nnn*, where *nnn* is the resolution of your printer, you may need to change the printer characteristics to match those of the printer. Ask your administrator for the needed information, or consult the printer documentation.

Sending a File to an E-mail Destination

When you submit a print request, you can send the file to an e-mail destination instead of to a printer. When you send a file to an e-mail destination, your administrator can specify the e-mail address list of the recipients in the printer definition in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the E-mail Address List in an Alias File" on page 110.

The e-mail has the following characteristics:

- The file is an attachment to the e-mail. The name of the attachment is the name specified in the **sysout-dataset-name** job attribute. If this attribute is not specified, the name of the attachment is the last 8 characters of the file name. A pound sign (#) is used in the file name instead of any character that the system does not allow in a file name on the JES spool; for example a slash or a period is replaced with a pound sign.

  The attachment name contains an extension that indicates the type of data in the file. For example, `txt` indicates text data, and `pdf` indicates PDF data.
- The subject of the e-mail is the value specified to the Port Monitor in the **title-text** job attribute. If none is specified, the subject is the title your administrator specified in the Allocation section of the printer definition. If no title is specified in the printer definition, the subject is the job name; if you use the LPR command, you can specify the job name in -J option.
- The sender is the Windows user ID of the user who submitted the print request.
- You cannot receive replies to the e-mail.

Printing Files

You can use the following methods to print a file:

- Print function on any Windows application that supports printing; see "Printing from a Windows Application".
- Windows **print** command; see "Using the print Command" on page 176.
- Windows LPR command; see "Using the LPR Command" on page 176.

Printing from a Windows Application

To print from a Windows application, simply use the print function provided by the application and select the Windows printer you defined in "Adding a z/OS Printer to Your Windows System" on page 169.

If you are using the Infoprint Port Monitor and selected **Prompt for attributes when printing** when you customized the Infoprint Port Monitor, the Infoprint Server Options dialog box will be displayed. (If the Infoprint Port Monitor is busy transmitting a file or if your Windows system is busy, this dialog box might not be displayed immediately.) In the **Job Attributes** field, you can add any of the attributes described in Chapter 3, "Using Job Attributes" on page 83, or change any of the default attributes that you entered when you added the printer.

For example, if you want to print three copies of this file on one side of the paper, change the **Job Attributes** field to read:

```
copies=3 duplex=no
```

Only IBM AFP printers support the **duplex** attribute. VTAM-controlled printers and some IPP-enabled printers do not support the **copies** attribute. If you send the file to an e-mail destination, only one copy is sent.

Note: If the Windows printer is defined as a shared printer, do *not* select the **Prompt for attributes when printing** option because the Infoprint Server Options dialog box is displayed only on the Windows system where the Infoprint Port Monitor is installed.

Using the print Command

Some Windows systems provide a **print** command, which you can use to print files to a printer you defined in "Adding a z/OS Printer to Your Windows System" on page 169. To use the **print** command, you or your Windows administrator must define the z/OS printer as a Windows shared printer. The **print** command lets you print a file directly without using a Windows application that supports printing.

You can specify the following command and options when you print to Infoprint Server:

```
print  /d:\\servername\print_share file
```

where:

servername
: Specifies the name of the Windows server on which the z/OS printer was defined as a Windows shared printer. The Windows server can be your own Windows system or a different Windows system.

print_share
: Specifies the name of the Windows printer.

file
: Specifies the location and name of the file you want to print. You can include multiple files on one command line.

Using the LPR Command

Some Windows systems provide an LPR command, which you can use to print files to any printer defined to Infoprint Server in the Printer Inventory. The LPR command lets you print a file directly without using a Windows application that supports printing.

To use the LPR command, the administrator must have configured the Infoprint Server LPD to listen at port 515. If the Infoprint Server LPD listens at a different port, use the **print** command instead. To use the **print** command, you must configure the Infoprint Port Monitor to submit print requests to the port at which the Infoprint Server LPD is listening.

You can specify the following command and options when you print to Infoprint Server:

```
LPR  -S server -P printer -J job file
```

where:

server
: Specifies the IP address or host name of the z/OS system on which Infoprint Server is running.

printer
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

job
Specifies a job name that is printed as the title on a separator page. Whether or not the title is printed depends on how the administrator has configured the printer's separator page. If the file is sent to an e-mail destination, this job name is used as the subject of the e-mail.

file
Specifies the name of the file you want to print or send to an e-mail destination.

Infoprint Server does *not* support or require the following LPR options:

-C *class*
Infoprint Server does not support this option. It is ignored if specified.

-d
The LPR sends the data file first. Infoprint Server supports this option; however, IBM recommends that you do not specify it for large files or files that need to be transformed to another data format because it can hurt system performance.

-o *option*
Indicates the type of print file. This option is not required because Infoprint Server automatically detects the type of file.

-x Infoprint Server does not support this option.

Uninstalling the Infoprint Port Monitor for Windows

The instructions to uninstall the Infoprint Port Monitor are different for Version 1 and Version 2 of the port monitor. To determine the version installed on your system:

- **Windows 95/98, Windows NT and Windows 2000 systems:**
  1. From the Windows Control Panel, open **Add/Remove Programs**. If the Infoprint Port Monitor is listed, then Infoprint Port Monitor Version 2.0.0, or later, is installed.
  2. If the Infoprint Port Monitor is not listed, select **Start –> Programs**. If Infoprint Port Monitor is listed, then Infoprint Port Monitor Version 1.0 is installed.
- **Windows Me and Windows XP systems:** Infoprint Port Monitor Version 2.0.0 is installed.

Tip: When you upgrade the Infoprint Port Monitor for Windows to Version 2.0.0, do *not* uninstall the current version. When you upgrade to Version 2.0.0, the Infoprint Port Monitor saves your existing Windows printers defined at Infoprint ports but *only* if you have not uninstalled the Infoprint Port Monitor.

Steps to Uninstall Infoprint Port Monitor Version 2.0.0 and Later

To uninstall Infoprint Port Monitor Version 2.0.0 and later versions, use the standard Windows uninstall procedure. From the Windows Control Panel window, open **Add/Remove Programs**. Follow the instructions in the Add/Remove Program Properties dialog box to remove the Infoprint Port Monitor.

Steps to Uninstall Infoprint Port Monitor Version 1.0 on Windows 95/98 Systems

Follow these steps to uninstall Infoprint Port Monitor Version 1.0 on Windows 95/98 systems.

Tip: Do *not* run the `unInstallShield` program provided with Infoprint Port Monitor Version 1.0 because this program does not work.

1. Remove port monitor data from the registry.
   a. Start the registry editor using one of the following methods:
      - Enter `regedit` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** --> **MS-DOS Command Prompt**.
      - Enter `regedit` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.

   b. Select the **+** icon to expand **HKEY_LOCAL_MACHINE** and then expand **SOFTWARE**.
   c. Delete the location of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, expand **IBM** and then delete **Infoprint Port Monitor**.
      - If you installed an early version of the port monitor, expand **IBM Printing Systems** and then delete **OS/390 Port**.

   d. Select the **—** icon to collapse SOFTWARE.
   e. Expand **System**, **CurrentControlSet**, **Control**, **Print**, and then **Monitors**.
   f. Delete the name of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete **Infoprint Printer Port**.
      - If you installed an early version of the port monitor, delete **OS/390 Printer Port**.

   g. Close the registry editor.
2. Restart your workstation.
3. Erase **ipmon95.dll** and **ip39095.dll** from the Windows system directory (typically **c:\windows\system**).

   Note: You cannot erase these files until you have updated your registry and restarted your workstation.
4. Remove the port monitor's install directory and the files in it.
   a. Start Windows Explorer: select **Start** on the task bar; then select **Programs** and choose **Windows Explorer**.
   b. Delete the port monitor's install directory for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete the default directory, **c:\Infoprint**, or the directory you specified during installation.
      - If you installed an earlier version of the port monitor, delete the default directory, **c:\os390**, or the directory you specified during installation.

   c. Close Windows Explorer.
5. Remove the port monitor from Programs:
   a. Select **Start** on the task bar; then select **Settings** and choose **Taskbar**.
   b. Select the **Start Menu Programs** tab.
   c. Click **Remove**.
   d. Expand **Programs**, if necessary.
   e. Remove the name of the port monitor for the version you installed:

- If you installed a recent version of the port monitor, select **Infoprint Port Monitor** and then click **Remove**.
- If you installed an earlier version of the port monitor, select **OS/390 Printer Port** and then click **Remove**.

f. Click **OK**.

Steps to Uninstall Infoprint Port Monitor Version 1.0 on Windows NT and Windows 2000 Systems

Follow these steps to uninstall Infoprint Port Monitor Version 1.0 on Windows NT and Windows 2000 systems.

Tip: Do *not* run the `unInstallShield` program provided with Infoprint Port Monitor Version 1.0 because this program does not work.

1. Remove port monitor data from the registry:
   a. Start the registry editor using one of these methods:
      - Enter `regedt32` in an MS-DOS Command Prompt window. To open an MS-DOS Command Prompt window, select **Start** on the task bar; then select **Programs** -> **MS-DOS Command Prompt**.
      - Enter `regedt32` in a Run dialog box. To open a Run dialog box, select **Start** on the task bar; then select **Run**.

   b. Double-click the **+** icon to expand **HKEY_LOCAL_MACHINE** and then expand **SOFTWARE**.
   c. Delete the location of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, expand **IBM**, select **Infoprint Port Monitor**, select **Edit** on the Menu bar, and then click **Delete**.
      - If you installed an early version of the port monitor, expand **IBM Printing Systems**, select **OS/390 Port**, select **Edit** on the Menu bar, and then click **Delete**.

   d. Double-click the **—** icon to collapse SOFTWARE.
   e. Expand **SYSTEM**, **CurrentControlSet**, **Control**, **Print**, and then **Monitors**.
   f. Delete the name of registry data for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, select **Infoprint Printer Port**, select **Edit** on the Menu bar, and then click **Delete**.
      - If you installed an early version of the port monitor, select **OS/390 Printer Port**, select **Edit** on the Menu bar, and then click **Delete**.

   g. Close the registry editor.
2. Stop the Spooler service:
   a. Select **Start** on the task bar; then select **Settings** -> **Control Panel**.
   b. Double-click **Services**.
   c. Select **Spooler** and then select **Stop**.
3. Erase **ipmonnt.dll** and **ip390nt.dll** from the Windows system directory (typically **c:\winnt\system32**). Note: You cannot erase these files until you have stopped the spooler service or shut down and restarted your workstation.
4. Start the Spooler service:
   a. Select **Start** on the task bar; then select **Settings** -> **Control Panel**.
   b. Double-click **Services**.

c. Select **Spooler** and then select **Start**.

5. Remove the port monitor's install directory and the files in it:
   a. Start Windows NT Explorer: select **Start** on the task bar; then select **Programs** -> **Windows NT Explorer**.
   b. Delete the port monitor's install directory for the version of the port monitor you installed:
      - If you installed a recent version of the port monitor, delete the default directory, **c:\Infoprint**, or the directory you specified during installation.
      - If you installed an earlier version of the port monitor, delete the default directory, **c:\os390**, or the directory you specified during installation.
   c. Close Windows NT Explorer.
6. Remove the port monitor from Programs:
   a. Select **Start** on the task bar; then select **Settings** -> **Taskbar**.
   b. Select the **Start Menu Programs** tab.
   c. Click **Remove**.
   d. Expand **Programs**, if necessary.
   e. Remove the name of the port monitor for the version you installed:
      - If you installed a recent version of the port monitor, select **Infoprint Port Monitor** and then click **Remove**.
      - If you installed an earlier version of the port monitor, select **OS/390 Printer Port** and then click **Remove**.
   f. Click **OK**.

Chapter 9. Printing from Remote Non-Windows Systems

This chapter describes how to print from non-Windows workstations where Transmission Control Protocol/Internet Protocol (TCP/IP) is installed. For detailed information about the syntax of the commands described in this chapter, refer to the documentation for each remote system.

Notes:

1. Infoprint Server might ignore some command options. For example, it ignores command codes that contain information for printing on separator pages if your administrator has not configured the separator pages to show this information.
2. Infoprint Server accepts commands that are sent from any port on the sending host.
3. If Infoprint Server Transforms is installed on the z/OS system, your data streams can be automatically transformed into the format accepted by the printer. PCL, PDF, PostScript, and SAP data streams can be transformed to AFP format; AFP data streams can be transformed to PCL, PDF, or PostScript format.

Submitting a Print Request

You can use the LPR command to submit a print request. From an Advanced Interactive Executive (AIX) system, you can also use the **enq** command.

Before you begin: Before you use an LPR or **enq** command, ask your administrator for the following information:

- The host name or Internet Protocol (IP) address of the z/OS system on which Infoprint Server is running.
- The name of the printer definition created for the printer. This name is case sensitive. You must specify this name as the name of the printer or print queue.
- The name of a suitable printer driver for the z/OS printer if you print from an OS/2 system.

The OS/400 LPR command and the AIX **enq** command let you specify Infoprint Server job attributes, which are described in Chapter 3, “Using Job Attributes” on page 83.

For more information about how to submit an LPR or **enq** command from a particular system, see the following sections:

- “Printing from an AIX Workstation” on page 183
- “Printing from an OS/2 Workstation” on page 184
- “Printing from A Remote OS/390 or z/OS System” on page 185
- “Printing from a VM or z/VM System” on page 185
- “Printing from an OS/400 System” on page 185

After receiving a print request, Infoprint Server returns either an error message or a job identifier. The job identifier indicates that Infoprint Server has accepted the print request. You can use the job identifier to query the status of the print request or to cancel the print request.

Sending a File to an E-mail Destination

When you use the LPR or **enq** command, you can send the file to an e-mail destination instead of to a printer. When you send a file to an e-mail destination, your administrator can specify the e-mail address list of the recipients in the printer definition for the e-mail destination in the Printer Inventory, or you can specify the address list in an alias file that your administrator defines to z/OS UNIX sendmail. For information, see "Specifying the E-mail Address List in an Alias File" on page 110.

The e-mail has the following characteristics:

- The file is an attachment to the e-mail. The name of the attachment is the name specified in the **sysout-dataset-name** job attribute. If this attribute is not specified, the name of the attachment is the last 8 characters of the file name. A pound sign (#) is used in the file name instead of any character that the system does not allow in a file name on the JES spool; for example a slash or a period is replaced with a pound sign.

  The name of the attachment contains an extension that indicates the type of data in the file. For example, `txt` indicates text data, and `pdf` indicates PDF data.
- The subject of the e-mail is the title specified in the **title-text** job attribute or the title specified on the LPR command. If none is specified, the title is the value your administrator specified in the Allocation section of the printer definition. If none is specified, the subject is the job name.
- The sender is the user who submitted the print request.
- You cannot receive replies to the e-mail.

Querying a Print Request

You can use the **lpq** command to query the names, locations, and descriptions of printers and to query the status of a print request. From an AIX system, you can also use the **qstat** command.

When you query the status of a print request, Infoprint Server returns one of the following states:

pending The file is waiting to print.

Note: Because JES3 cannot distinguish job states, in a JES3 environment Infoprint Server can return **pending** for files that have been selected for processing or held on the JES spool.

processing The file has been placed on the JES spool and selected for processing. It can be:

- Being transmitted to a local area network (LAN) printer or to a print server
- Printing

held The file is held on the JES spool and cannot print for one of these reasons:

- The user specified **hold=true** when submitting the job.

  Note: JES3 does not recognize a job that is held for this reason and returns **pending**.
- The operator held the job.

completed The file has been processed successfully. It remains on the JES spool for one of these reasons:

- Other files in the job are still being processed. The file will be removed from the spool after all files in the job have been processed.
- Your administrator has specified that files should be retained after transmission to a LAN printer or to a print server. The file will be removed from the spool when the retention period expires.

failed Processing has failed. The file remains on the JES spool for one of these reasons:

- Transmission to a LAN printer, to a print server, or to the z/OS UNIX sendmail function has failed. Your administrator has specified that files should be retained after transmission. The file will be removed from the spool when the retention period expires.
- An error occurred during processing. The file is held.

purged The file was deleted before printing.

Printing from an AIX Workstation

To print from an AIX system, you must configure a remote queue. During configuration of the remote queue, do the following:

- Specify the host name or IP address of the z/OS system as the host name.
- Specify the name of the printer definition as the queue name.
- Specify **BSD** as the type of print spooler.
- Specify the -X option for the remote queue in the **backend** option under the queue device name in the **/etc/qconfig** file. The -X option lets you specify Infoprint Server job attributes in the **-o** option on the **enq** command.

  If you print large files, especially files that will be transformed from one format to another on the z/OS system, also specify the -T option to increase the time-out value. The default time-out value is 90 seconds. Depending on the size of your files, you might need to specify a time-out value of a few minutes. For extremely large jobs, you might need to specify an hour or more.

  Also specify the -C option, which sends the control file first. This can improve system performance, especially when you print large files.

  The following **backend** option specifies a time-out value of 5 minutes in the -T option:

  ```
  backend=/usr/lib/lpd/rembak -X -T 5 -C
  ```

- After you change the **/etc/qconfig** file, delete the **/etc/qconfig.bin** file. Then, use the following commands to stop and restart the queue daemon:

  ```
  stopsrc -s qdaemon
  startsrc -s qdaemon
  ```

After you configure the remote queue, specify the name of the remote queue on the **enq**, **lpr**, or **lp** command, for example:

```
enq -P remotequeue -o "XAOPattribute=value..." file
lpr -P remotequeue file
lp -d remotequeue file
```

where:

-d *remotequeue*
Specifies the name of the remote queue.

-P *remotequeue*
Specifies the name of the remote queue.

-o "XAOP*attribute=value...***" | -o 'X** *attribute=value...***'**
Specifies any job attributes you want to use to print the job. If there are any spaces or special characters in the list of job attributes, surround the string with single or double quotation marks.

For a list of job attributes that you can specify, see Chapter 3, “Using Job Attributes” on page 83.

If there are errors in the list of attributes and you use the **XAOP** form of the prefix, the job is rejected. If you use the **X** form of the prefix, the job is processed without the attributes.

Limitation: The **lpr** and **lp** commands do *not* support the **-o** option.

file
Specifies the name of the file you want to print.

Printing from an OS/2 Workstation

You can print from an IBM Operating System/2 (OS/2) system that uses TCP/IP version 3.0, either from within an OS/2 application or by using the drag-and-drop method of printing. Before printing, you must configure TCP/IP and define the z/OS printer to the OS/2 system. To define a printer, do the following

- Select an LPD port as the output port.
- Change the properties of the output port, as follows:
  - Specify the host name or IP address of the z/OS system as the LPD server.
  - Specify the name of the printer definition in the Printer Inventory as the LPD printer. This name is case sensitive.
  - Optionally specify your system name and user name in the print source fields.
- Select a printer driver that is suitable for the type of printer; for example, select a PostScript driver for a printer that can print PostScript data streams. The printer driver creates output in a format that the printer understands.

  If the printer is an IBM AFP printer, you can select a generic text driver. However, if your installation has installed either the PCL to AFP transform or the PostScript to AFP transform on the z/OS system, you can get higher-quality output if you select a PCL or PostScript driver.

To print to the z/OS printer from the command line, use the **lpr** command. For example:

```
lpr -p printername -s hostaddress filename [-b]
```

where:

-p *printername*
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

-s *hostaddress*
Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

filename
Specifies the name of the file you want to print.

-b Specifies that the document contains data that must be interpreted as binary. Specify this option to print a document in PCL, PDF, PostScript, SAP, or AFP format.

Printing from A Remote OS/390 or z/OS System

To print from a remote z/OS system, use the LPR command from a TSO session:

```
LPR 'filename' (P printername AT hostaddress TITLE title
```

where:

filename
Specifies the name of the file you want to print.

P *printername*
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

AT *hostaddress*
Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

TITLE *title*
Specifies a title that can be printed on a separator page if your administrator has configured the separator page to do so. If the file is sent to an e-mail destination, the title becomes the subject of the e-mail.

Printing from a VM or z/VM System

To print from a Virtual Machine (VM) or z/VM system, use the LPR command. For example:

```
LPR filename (PRINTER printername HOST host_address
```

where:

filename
Specifies the file name, file type, and file mode of the file you want to print.

PRINTER *printername*
Specifies the name of the printer definition in the Printer Inventory. This name is case sensitive.

HOST *hostaddress*
Specifies the IP address or host name of the z/OS host on which Infoprint Server is running.

Printing from an OS/400 System

The most convenient way to print from an OS/400 system is to perform these steps:

1. Define a remote print queue for a printer that your administrator has defined to Infoprint Server, if the administrator has not already done so. To do this:
   a. Enter the CRTOUTQ command on the OS/400 command line.
   b. Fill in the panels as follows:

      Output queue
      The name you want to give to the remote output queue.

Remote system
The host name or IP address of the z/OS system on which Infoprint Server is running.

Remote print queue
The name of a printer definition that your administrator has created.

Writers to autostart
1

Connection type
*IP

Destination type
*OTHER

Host print transform
Specify *NO to print the Advanced Function Presentation (AFP) data stream. Specify *YES to print the Systems Network Architecture (SNA) character string (SCS) data stream.

Manufacturer type and model
*WSCST

Workstation customizing object
QSYS/QWPDEFAULT

Destination options
Specify any job attributes you want to use to print the job. Use one of these two formats:

```
'XAOPattribute=value...'
'Xattribute=value...'
```

Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.

For a list of job attributes that you can specify, see Chapter 3, “Using Job Attributes” on page 83.

If there are errors in the list of attributes and you use the XAOP form of the prefix, the job is rejected. If you use the X form of the prefix, the job is processed without the attributes.

2. Submit the file you want to print to the remote print queue exactly as you would submit it to a local print queue.
3. Enter the following command to start a remote printer writer:

   ```
   STRRMTWTR outputqueuename
   ```

   where *outputqueuename* is the name of the remote output queue. The remote printer writer takes files from the output queue and sends them to the printer.
4. To end the remote printer writer, enter the following command:

   ```
   ENDWTR outputqueuename
   ```

You can also use the LPR command to send files to z/OS. The files must already be on the spool, in a queue that does not have a printer writer started against it. You do not define a remote output queue, but you specify many of the same options for the LPR command as you would for a remote output queue. You can also specify job attributes on the LPR command. For example:

```
LPR RMTSYS(hostname) PRTQ('printqueue') FILE(filename)
   JOB(jobid/userid/jobname) SPLNBR(n) MFRTYPMDL(*WSCST)
   WSCST(QSYS/QWPDEFAULT) TRANSFORM(*NO)
   DESTOPT('XAOPattribute=value...')
```

where:

RMTSYS(*hostname***)**
Specifies the host name of the z/OS host on which Infoprint Server is running.

PRTQ('*printqueue***')**
Specifies a print queue defined in a printer definition. If the print queue name contains lower-case characters, you must surround it in single or double quotation marks.

FILE(*filename***)**
Specifies the file name of the file you want to print.

JOB(*jobid/userid/jobname***)**
Identifies the job by number, user ID of the job owner, and name. You can determine this information by entering the WRKOUTP command to view a list of spooled files.

SPLNBR(*n***)**
Specifies the spool file number of the file you want to print. You can determine the spool file number by viewing a list of spooled files.

MFRTYPMDL(*WSCST)
Specifies that the manufacturer, type, and model of the printer are as defined in the workstation customizing object.

WSCST(QSYS/QWPDEFAULT)
Specifies the workstation customizing object as QSYS/QWPDEFAULT.

TRANSFORM({*YES|*NO})
Specifies whether to transform the data to American Standard Code for Information Interchange (ASCII) format. Specify *YES for SCS data; *NO for AFP data.

DESTOPT('XAOP*attribute=value...***')**
DESTOPT('X*attribute=value...***')**
Specifies any job attributes you want to use to print the job. Surround the entire value, including the X or XAOP prefix and the list of attributes, in single quotation marks, as shown. If any of the attribute values contains special characters, surround the value in double quotation marks.

For a list of job attributes that you can specify, see Chapter 3, “Using Job Attributes” on page 83.

If there are errors in the list of attributes and you use the XAOP form of the prefix, the job is rejected. If you use the X form of the prefix, the job is processed without the attributes.

When you print a text document from an OS/400 system using a workstation customization object of QSYS/QWPDEFAULT, Infoprint Server might not recognize the data format as text. Either Infoprint Server rejects the job or data does not print as expected.

This problem occurs because the host print transform and workstation customization object QSYS/QWPDEFAULT on the OS/400 system inserts an initial null byte into the print file before sending it to Infoprint Server. The null byte prevents Infoprint Server from recognizing the data format as text.

To correct this problem, you can use the following source statements to create a workstation customization object that does not insert an initial null byte. These statements are the same as for the QSYS/QWPDEFAULT object, but with :INITPRT DATA='00'X. removed. For information about how to create a customization object, refer to *OS/400 Workstation Customization Programming V4R3*.

```
:WSCST DEVCLASS=TRANSFORM.
  :TRNSFRMTBL.
  :SPACE
    DATA ='20'X.
  :CARRTN
    DATA ='0D'X.
  :FORMFEED
    DATA ='0C'X.
  :LINEFEED
    DATA ='0A'X.
  :EWSCST.
```

Printing from a Novell NetWare Client

You can use standard printing procedures to submit jobs to Infoprint Server from clients connected to a Novell NetWare 3.x, 4.x, or 5.x server. Your Novell administrator must create a NetWare print queue on the NetWare server and configure the queue to use the LPD protocol to send print jobs to the Infoprint Server LPD on the z/OS system. You must know the name of the NetWare print queue in order to submit jobs.

Appendix A. Job Attributes and JCL Parameters Valid for Different Printer Types

Table 10 shows which job attributes and JCL parameters Infoprint Server can validate for a selected printer. Infoprint Server checks the value you specify in these job attributes and JCL parameters against the supported values the administrator specifies in the printer definition.

Table 10. Job Attributes and JCL Parameters Validated for the Printer

Job Attribute	JCL Parameter	Value Validated for Printer
address-text	ADDRESS	No
building-text	BUILDING	No
carriage-control-type	RECFM	No
chars	CHARS	No
copies	COPIES	Yes
department-text	DEPT	No
document-codepage	none	No
document-format	none	Yes
document-type	none	No
duplex	DUPLEX	Yes
filter-options	none	No
form-definition	FORMDEF	No
forms	FORMS	Yes
hold	HOLD OUTDISP (JES2 only)	No
input-tray	none	Yes
input-tray-number	INTRAY	No
jes-priority	PRTY	No
name-text	NAME	No
output-bin	none	Yes
output-bin-number	OUTBIN	No
overlay-back **overlay-front**	OVERLAYB OVERLAYF	No
page-definition	PAGEDEF	No
print-error-reporting	DATACK	Yes
print-queue-name	PRTQUEUE	No
printer-ip-address	DEST=IP	No
resource-library	USERLIB	No
room-text	ROOM	No
shift-out-shift-in	PRMODE	No
sysout-dataset-name	DSNAME	No
sysout-job-id	none	No
sysout-job-name	job name	No

Table 10. Job Attributes and JCL Parameters Validated for the Printer (continued)

Job Attribute	JCL Parameter	Value Validated for Printer
table-reference-characters	DCB OPTCD=J TRC	No
title-text	TITLE	No
x-image-shift-back **x-image-shift-front**	OFFSETXB OFFSETXF	No
y-image-shift-back **y-image-shift-front**	OFFSETYB OFFSETYF	No

Appendix B. JCL Parameters and Corresponding Job Attributes

Table 11 lists parameters of the OUTPUT and DD JCL statements and the Infoprint Server job attributes that correspond to them. Some job attributes, such as **document-format**, do not have corresponding JCL parameters. You can specify job attributes in a batch application when you use the AOPPRINT JCL procedure and when you use the Print Interface subsystem.

Table 11. JCL Parameters and Corresponding Job Attributes

JCL Parameter	Job Attribute	See Page
ADDRESS	**address-text**	85
BUILDING	**building-text**	86
CHARS	**chars**	86
COPIES	**copies**	88
DATACK	**print-error-reporting**	98
DCB OPTCD=J	**table-reference-characters**	103
DEPT	**department-text**	88
DEST=IP	**printer-ip-address**	99
DSNAME	**sysout-dataset-name**	101
DUPLEX	**duplex**	90
FORMDEF	**form-definition**	92
FORMS	**forms**	93
HOLD[1] OUTDISP (JES2 only)	**hold**	93
INTRAY	**input-tray** **input-tray-number**	93
job name (on JOB statement)	**sysout-job-name**	102
NAME	**name-text**	95
OFFSETXB	**x-image-shift-back**	104
OFFSETXF	**x-image-shift-front**	105
OFFSETYB	**y-image-shift-back**	105
OFFSETYF	**y-image-shift-front**	106
OUTBIN	**output-bin** **output-bin-number**	96
OVERLAYB	**overlay-back**	97
OVERLAYF	**overlay-front**	97
PAGEDEF	**page-definition**	98
PRMODE	**shift-out-shift-in**	100
PRTQUEUE	**print-queue-name**	98
PRTY	**jes-priority**	95
RECFM	**carriage-control-type**	86
ROOM	**room-text**	100
TITLE	**title-text**	103

Table 11. JCL Parameters and Corresponding Job Attributes (continued)

JCL Parameter	Job Attribute	See Page
TRC	**table-reference-characters**	103
USERLIB	**resource-library**	99
none	**document-codepage**	88
none	**document-format**	89
none	**document-type**	89
none	**filter-options**	91
none	**sysout-job-id**	102

1. When you use the Print Interface subsystem, you cannot specify the HOLD parameter on the DD JCL statement; however, you can specify the OUTDISP parameter on the OUTPUT JCL statement.

Appendix C. NetSpool Support for SCS Code Points

The NetSpool component of Infoprint Server converts the Systems Network Architecture (SNA) character stream (SCS) for a logical unit (LU) type 1 printer into one of the following data streams:

- Line data stream: If the administrator selects the **Convert to line** formatting option, NetSpool creates EBCDIC variable-length records, each record starting with an American Standards Association (ASA) carriage-control character.
- PCL data stream: If the administrator selects the **Convert to PCL** formatting option, NetSpool creates an ASCII text data stream with embedded PCL commands.

NetSpool returns the following SNA sense codes for errors found in the SCS data stream:

- SNA sense code of function error (X'10030000') for undefined and unsupported code points.
- SNA sense code of parameter error (X'10050000') for supported code points with invalid parameters or without all parameters available in the same chain.
- SNA sense code of data error (X'10010000') for invalid characters in a DBCS string.

NetSpool passes all other unspecified code points to JES as text data to be printed.

Refer to the following publications for information about SCS data streams:

- *SNA - Sessions Between Logical Units*
- *IPDS and SCS Technical Reference*

Table 12 describes the SCS code points that are supported and unsupported when NetSpool creates line data or PCL data streams.

Table 12. SCS Code Points

Control Code	EBCDIC	Name	Line Support	PCL Support
BEL	X'2F'	Bell function	Ignore	Ignore
BS	X'16'	Back space	Yes	Yes
CR	X'0D'	Carriage return	Yes	Yes
EBS	X'36'	Expanded back space	Yes	Yes
ENP	X'14'	Enable presentation	Ignore	Ignore
ESP	X'E1'	Expanded space	Yes	Yes
FF	X'0C'	Form feed	Yes	Yes
GE	X'08'	Graphic escape	Yes	Yes
HT	X'05'	Horizontal tab	Yes	Yes
IT	X'39'	Indent tab	Ignore	Ignore
IR	X'33'	Index return	Yes	Yes
INP	X'24'	Inhibit presentation	Ignore	Ignore
IFS	X'1C'	Interchange file separator	Yes	Yes
IGS	X'1D'	Interchange group separator	Yes	Yes

Table 12. SCS Code Points (continued)

Control Code	EBCDIC	Name	Line Support	PCL Support
IRS	X'1E'	Interchange record separator	Yes	Yes
IUS	X'1F'	Interchange unit separator	Yes	Yes
LF	X'25'	Line feed	Yes	Yes
NL	X'15'	New line	Yes	Yes
NULL	X'00'	Null	Ignore	Ignore
PP	X'34xxnn'	Presentation position (See Table 13 on page 197.)	Yes	Yes
PPM	X'2BD2...'	Page presentation media (See Table 14 on page 198.)	Ignore	Yes
RFF	X'3A'	Required form feed	Yes	Yes
RNL	X'06'	Required new line	Yes	Yes
RSP	X'41'	Required space	Yes	Yes
SA	X'28xxxx'	Set attribute (See Table 21 on page 199.)	Yes	Ignore/Error
SBS	X'38'	Subscript	Ignore	Yes
SCI	X'2BDx'	Set chain image	Ignore	Ignore
SGEA	X'2BC8'	Set graphic error action	Ignore	Ignore
SHF	X'2BC1xx'	Set horizontal format (See Table 22 on page 200 and Table 23 on page 201.)	Yes	Yes
SHY	X'CA'	Syllable hyphen	Yes	Yes
SI	X'0F'	Shift in[1]	Yes	Error
SLD	X'2BC602xx' or X'2BC601'	Set line density	Ignore	Yes
SLP	X'04C1'	Select left platen	Ignore	Ignore
SME	X'046x'	Select magnetic encoder	Error	Error
SO	X'0E'	Shift out[1]	Yes	Error
SOF	X'2BC3'	Start of format	Yes	Yes

Table 12. SCS Code Points (continued)

Control Code	EBCDIC	Name	Line Support	PCL Support
SPD	X'2BD20229' or X'2BD20429xxxx' **Note:** X'2BD20229' indicates to set the print density to the default setting. 'xxxx' specifies the number of characters per inch. This is a two byte binary number. The first byte is X'00' and the second byte is the print density hex value.	Set print density	Ignore	Yes
SPS	X'09'	Superscript	Ignore	Yes
SRP	X'04C2'	Select right platen	Ignore	Ignore
SSR	X'0450'	Secure string ID reader	Error	Error
STT	X'2BD1xx'	Set translate table	Ignore	Ignore
SUB	X'3F'	Substitute	Yes	Yes
SVF	X'2BC2'	Set vertical format (See Table 24 on page 201 and Table 25 on page 202.)	Yes	Yes
TRN	X'35'	Transparent	Yes	Yes
UBS	X'1A'	Unit backspace	Ignore	Ignore
VCS	X'04xx' **Note:** 'xx' is a two byte order. Byte two defines the function: • 50 Magnetic stripe reader - error • 60, 61 Magnetic stripe writer - error • 7A-7C Vertical channels 10 through 12 - skip to channel • 81-89 Vertical channels 01 through 09 - skip to channel • C1, C2 Select Left/Right Platten - ignore • Other - error	Vertical channel select	Yes	Yes
VT	X'0B'	Vertical tab	Yes	Yes
WUS	X'23'	Word underscore	Yes	Yes

Table 12. SCS Code Points (continued)

Control Code	EBCDIC	Name	Line Support	PCL Support
• Yes—Supported • Ignore—Netspool removes the control code from the data stream and does not report an error. • Error—Undefined or unsupported code point-function or parameter error				

Note:

1. Shift Out (SO) indicates the start of a string of double-byte character set (DBCS) data. Shift In (SI) indicates the end. Valid characters in the DBCS string are X'4040' and any pair of bytes, each in the range X'41' to X'FE'. NetSpool rejects invalid characters and DBCS strings that do not complete in the same chain with an SNA sense code of data error (X'10010000').

Presentation Position Command

The Presentation Position command (X'34xxnn') is a three byte command that moves the print head to a new horizontal or vertical position. The movement can be absolute or relative to the current column or line. Byte 2 is the function code. Byte 3 is a relative or absolute line or column number. NetSpool supports this command when it converts the input data stream to either a line data or a PCL data stream.

The movement can be absolute or relative to the current column or line. There are variations of movement with or without erase that are intended for display devices only. ″Erase to new position and return to former position″ commands are ignored. ″Move with erase″ creates the same output as ″move without erase.″ Movement to the right inserts blank columns in the line. Movement to the left causes the current line to be written and a new blank line set up for overstrike starting at the specified column. Movement to a higher line number causes the current line and some blank lines to be written. Movement to a lower line number causes the current line, a form feed, and some number of blank lines to be written.

Table 13. Presentation Position X'34xxnn'

Byte 1	Byte 2 (xx) Function Code	Function Parameter	Function Parameter Action (Line data and PCL)	Byte 3 (nn) Value Parameter
X'34'	X'C0'	Absolute, Horizontal (no erase)	Move Presentation Position and do not erase	1-byte binary number denoting either absolute or relative column number.
	X'C1'	Absolute, Horizontal (erase, return)	NetSpool ignores this function code	
	X'C2'	Absolute, Horizontal (erase, move)	Erase line to and move to new Presentation Position	
	X'C4'	Absolute, Horizontal (no erase)	Move Presentation Position and do not erase	
	X'C5'	Absolute, Horizontal (erase, return)	NetSpool ignores this function code	
	X'C6'	Absolute, Horizontal (erase, move)	Erase Column to new Presentation Position and move to new Presentation Position	
	X'C8'	Absolute, Horizontal (no erase, move)	Move Presentation Position and do not erase	
	X'C9'	Absolute, Horizontal (erase, return)	NetSpool ignores this function	
	X'4A'	Absolute, Horizontal (erase, move)	Erase line through, and move to new Presentation Position	
	X'4C'	Absolute, Horizontal (erase, move)	Move Presentation Position and do not erase	
	X'4D'	Absolute, Horizontal (erase, return)	NetSpool ignores this function	
	X'4E'	Absolute, Horizontal (erase, move)	Erase column through new Presentation Position and move to new Presentation Position	

Presentation Page Media Control

The Presentation Page Media control (X'2BD2') lets you select paper sources and specify simplex or duplex printing. NetSpool supports this control only when it converts the input data stream to a PCL data stream.

Table 14. Presentation Page Media (2BD2)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12
X'2B'	X'D2'	NN count byte	X'48'	X'00'	X'00'	FC forms control	SD source drawer	DDO offset	DD destination drawer	X'00'	DX simplex or duplex

Table 15. Presentation Page Media (2BD2) nn (count byte)

nn (count byte)	Description	PCL Command
X'02'	Select Tray 1	<ESC>&l1H
X'05'	Use FC byte to select Paper Menu/Source	
X'06'	Use FC byte to select Source Drawer	
X'0A'	Use FC, SD, and DX bytes	

Table 16. Presentation Page Media (2BD2) FC (forms control byte)

FC (forms control byte)	Description	PCL Command
X'00'	Ignore	
X'01'	Use SD byte	
X'02'	Select auxiliary tray	<ESC>&l4H
X'03' X'04'	Select auxiliary tray - manual feed	<ESC>&l2H
X'FF'	Select Tray 1	<ESC>&l1H
other values	use SD byte	

Table 17. Presentation Page Media (2BD2) SD (source drawer byte)

SD (source drawer byte)	Description	PCL Command
X'00'	Ignore	
X'01' X'FF'	Select Tray 1	<ESC>&l1H
X'02'	Select Tray 2	<ESC>&l5H
X'03'	Select Tray 3	<ESC>&l7H
X'04'	Select Auxiliary Feeder	<ESC>&l2H
X'05'	Select Tray 4	<ESC>&l8H
X'06'	Select Tray 5	<ESC>&l9H
other values	Use Tray 1	<ESC>&l1H

Table 18. Presentation Page Media (2BD2) DDO (destination drawer offset)

DDO (destination drawer offset)	Description	PCL Command
X'00'	Ignore	
other values	Offset	<ESC>&l1T

Table 19. Presentation Page Media (2BD2) SD (destination drawer byte)

SD (destination drawer byte)	Description	PCL Command
X'00'	Ignore	
X'01'	Select Default Output Bin	<ESC>&l1G
X'02'	Select Output Bin 2	<ESC>&l2G
X'03'	Select Output Bin 3	<ESC>&l3G
X'04'	Select Output Bin 4	<ESC>&l4G
other values	Select Default Output Bin	<ESC>&l1G

Table 20. Presentation Page Media (2BD2) DX (destination drawer duplex)

DX (destination drawer duplex)	Description	PCL Command
X'00'	Ignore	
X'01'	Simplex	<ESC>&l0S
X'02'	Duplex	<ESC>&l1S
X'03'	Tumble Duplex	<ESC>&l2S

Note: The ″l″ in the PCL commands above is actually a lower case ″L″.

SCS Set Attribute Control

Table 21. SCS Set Attribute (X'28xxyy')

Byte 1	Byte 2 Function Parameter	Function Description	Byte 3 Value	Line Data Support	PCL Support
X'28'	X'00'	Reset characteristics	X'00'	Reset to single byte character set	NetSpool ignores this function
	X'41'	Highlighting	any value	NetSpool ignores this function	NetSpool ignores this function
	X'42'	Color	any value	NetSpool ignores this function	NetSpool ignores this function

Table 21. SCS Set Attribute (X'28xxyy') (continued)

Byte 1	Byte 2 Function Parameter	Function Description	Byte 3 Value	Line Data Support	PCL Support
	X'43'	Character Set	X'00'	Reset character set to single byte character set.	Error
			X'F8'	Start of double byte character set data.	Error
			other values	Error	Error
	X'C2'	Field Outlining	any value	NetSpool ignores this function	NetSpool ignores this function

Table Note: Set Attribute X'2843F8' indicates the start of double-byte character set (DBCS) data. Set Attribute X'284300', X'280000', or end-of-chain indicates the end. Valid characters in the DBCS string are X'4040' and any pair of bytes, each in the range X'41' to X'FE'. NetSpool rejects invalid characters with an SNA sense code of data error (X'10010000').

NetSpool converts SA code points that indicate the start and end of a DBCS string into Shift Out (SO) and Shift In (SI) line-data controls. NetSpool converts valid SCS code points in the DBCS string to the appropriate line-data controls, delimited by SI and SO line-data controls.

Set Horizontal Format (SHF)

Table 22 describes the parameters that can be used with the SHF code point.

Table 22. Set Horizontal Format Parameters

SHF Parameter	Name	Range	Netspool default
MPP	Maximum line length	1–255	80 (The administrator can change the default in the printer definition in the Printer inventory.)
LM	SCS left margin (position of first column)	1–MPP	1 (The administrator can change the default in the printer definition in the Printer inventory.)

Table 22. Set Horizontal Format Parameters (continued)

SHF Parameter	Name	Range	Netspool default
RM	SCS right margin (position of last column)	LM-MPP	MPP (The administrator can change the default in the printer definition in the Printer inventory.)
HT	SCS horizontal tab settings		

SHF can be converted to a sequence of PCL Left Margin and PCL Right Margin commands. The horizontal tab settings, if specified, will be saved for use with the SCS Horizontal Tab control.

The definition in the **Content** column of Table 23 explains what values you should use in the corresponding column positions.

Table 23. Set Horizontal Format

Bytes	Content
1–2	X'2BC1'
3	Count of bytes following byte 2. It must be in range of 1–255 (count includes itself).
4 (optional)	MPP • 0 means to leave the hardware default • 1–255 are valid line lengths in the columns
5 (optional)	LM • 0 means to leave the hardware default • 1–MPP are valid column positions
6 (optional)	RM • 0 means to leave the current MPP (hardware default or this command) • LM–MPP are valid column positions
7–257 (optional)	HT • 0 is ignored • LM-RM are valid column positions

Set Vertical Format (SVF)

Table 24 describes the parameters that can be used with the SVF code point.

Table 24. Set Vertical Format Parameters

SVF Parameter	Name	Range	Netspool default
MPL	Maximum number of lines per page	1–255	1 (The administrator can change the default in the printer definition in the Printer inventory.)

Table 24. Set Vertical Format Parameters (continued)

SVF Parameter	Name	Range	Netspool default
TM	SCS top margin (position of first line)	1–MPL	1 (The administrator can change the default in the printer definition in the Printer inventory.)
BM	SCS bottom margin	MPL (If not specified the current MPL is used. The default of 1 indicates that the page length is controlled by form feeds placed in the data stream.)	MPL (The administrator can change the default in the printer definition in the Printer inventory.)
VT	SCS vertical tab settings		

SVF can be converted to a sequence of PCL Top Margin and PCL Page Length commands. The vertical tab settings, if specified, will be saved for use with the SCS Vertical Tab or Vertical Channel Select control.

The definition in the **Content** column of Table 25 explains what values you should use in the corresponding column positions.

Table 25. Set Vertical Format Convert to PCL

Bytes	Contents
1–2	X'2BC2'
3	Count of bytes following byte 2. It must be in range of 1–255 (count includes itself).
4 (optional)	MPL or page length • 0 means to leave the hardware default • 1–255 are valid page lengths in lines
5 (optional)	TM and Channel 01 • 0 means to leave the hardware default • 1–MPL are valid line numbers
6 (optional)	BM • 0 means to leave the current MPL (hardware default or this command) • TM–MPL are valid line numbers
7–257 (optional)	VT (7–18 are also channels 02–12) • 0 is ignored • TM+1-BM are valid line numbers

Appendix D. NetSpool Support for 3270 Data Streams Code Points

The NetSpool component of Infoprint Server converts 3270 data streams for logical unit (LU) type 0 and type 3 into one of the following data streams:

- Line data stream: If the administrator selects the **Convert to line** formatting option, NetSpool creates EBCDIC variable-length records, each record starting with an American Standards Association (ASA) carriage-control character.
- PCL data stream: If the administrator selects the **Convert to PCL** formatting option, NetSpool creates an ASCII text data stream with embedded PCL commands.

Table 26, Table 27, and Table 28 on page 204 describe the code points that are supported for 3270 data streams.

Refer to the following publications for information about 3270 data streams:

- *IBM 3270 Information Display System Reference Summary*
- *IBM 3270 Information Display System 3274 Control Unit Description*
- *IBM 3270 Information Display System Data Stream Programmer's Reference*
- *IBM 3270 Kanji Data Streams*

Command Codes

Only one command is allowed in each RU chain. The command must be the first byte of the RU chain.

Table 26 describes the code points that are supported for 3270 data streams.

Table 26. 3270 Data Stream Command Codes

Command Code	EBCDIC	Name
W	X'F1'	Write
EW	X'F5'	Erase/Write
EWA	X'7E'	Erase/Write Alternate
EAU	X'6F'	Erase All Unprotected
Other command codes		Function not supported. Returns SNA sense code X'1003000'

Control Codes

The control codes have an EBCDIC value in the range of X'00' through X'3F'. Table 27 describes the code points that are supported for 3270 data streams and also explains if it is fully supported.

Table 27. 3270 Data Stream Control Codes

Control Code	EBCDIC	Name	Line Support	PCL Support
CR	X'0D'	Carriage Return	Yes	Yes
EM	X'19'	End of Message	Yes	Yes

Table 27. 3270 Data Stream Control Codes (continued)

Control Code	EBCDIC	Name	Line Support	PCL Support
EUA	X'12'	Erase Unprotected to Address	Yes	Yes
FF	X'0C'	Form Feed	Yes[1]	Yes[1]
GE	X'08'	Graphic Escape	Yes	Yes
IC	X'13'	Insert Cursor	Yes	Yes
MF	X'2C'	Modify Field (See Table 28.)	Yes	Yes
NL	X'15'	New Line	Yes	Yes
PT	X'05'	Program Tab	Yes	Yes
RA	X'3C'	Repeat to Address	Yes	Yes
SA	X'28'	Set Attribute (See Table 28.)	Yes	Yes
SBA	X'11'	Set Buffer Address	Yes	Yes
SF	X'1D'	Start Field	Yes	Yes
SFE	X'29'	Start Field Extended (See Table 28.)	Yes	Yes
SI	X'0F'	Shift in	Yes	Error
SO	X'0E'	Shift out	Yes	Error
SYN	X'32'	SYN Character	Ignore	Ignore
Other control codes			Error	Error

Explanation of NetSpool support:
- Yes: The control code is supported
- Ignore: Netspool removes the control code from the data stream and does not report an error.
- Error: Netspool returns an SNA sense code X'1003000'.

1. The form feed (FF) control must occupy the first print position on a line. To put the FF control in the first position, place X'0C' after a Write Control Character, a NL control, or a CR control. The FF is printed as a space character.

Attribute Types

Table 28 describes the attribute types that are supported for 3270 data streams.

Table 28. 3270 Data Stream Attribute Types

Attribute Type	EBCDIC	SFE, MF Orders	SA Order	Comments
Character Attribute Reset	X'00'	N/A	X	Sets character set attribute to single byte character set (default)

Table 28. 3270 Data Stream Attribute Types (continued)

Attribute Type	EBCDIC	SFE, MF Orders	SA Order	Comments
Character Set	X'43'	X	X	When attribute value is X'00'-X'7F', character set attribute is set to single byte. When attribute value is X'F8'-X'FE', character set attribute is set to double byte; however, a value in this range is an error when converting to PCL.
3270 Field Attribute	X'C0'	X	N/A	Field attribute bit definitions supported: • Bit 2 = B'0' Field is unprotected. • Bit 2 = B'1' Field is protected. • Bits 4,5 = B'11' Field is nonprintable. • Bits 4,5 Other settings are ignored. All other bit definitions are ignored.
Other Valid Attributes	X'41', X'42', X'45', X'46', X'C2'	X	X	Ignored; defaults to no operation. Attributes are ignored.
Invalid Attributes		X	X	Function not supported. Returns SNA sense code X'1003000'.

N/A The attribute type does not apply to the order.

X The attribute type does apply to the order.

Appendix E. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using Assistive Technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard Navigation of the User Interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

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Bibliography

This section lists publications that may be helpful to you as you configure and use Infoprint Server.

Infoprint Server

Title	Order Number
Infoprint Server Transforms Licensed Program Specifications	G544-5797
z/OS Infoprint Server Customization	S544-5744
z/OS Infoprint Server Introduction	S544-5742
z/OS Infoprint Server Messages and Diagnosis	G544-5747
z/OS Infoprint Server Migration	G544-5743
z/OS Infoprint Server Operation and Administration	S544-5745
z/OS Infoprint Server User's Guide	S544-5746
Infoprint Server for z/OS Implementation Redbook	SG24–6234

Print Services Facility™ for OS/390

Title	Order Number
AFP Conversion and Indexing Facility: User's Guide	S544-5285
PSF for OS/390 & z/OS: Customization	S544-5622
PSF for OS/390 & z/OS: Diagnosis	G544-5623
PSF for OS/390 & z/OS: Download for OS/390	S544-5624
PSF for OS/390 & z/OS: Introduction	G544-5625
PSF for OS/390 & z/OS: Messages and Codes	G544-5627
PSF for OS/390 & z/OS: User's Guide	S544-5630

Advanced Function Presentation (AFP)

Title	Order Number
IBM Printing Systems: Printer Information	S544-5750
IBM Printing Systems: Printer Summary	S544-5749
AFP: Programming Guide and Line Data Reference	S544-3884
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM Data Stream and Object Arcitectures: Bar Code Object Content Architecture Reference	S544–3766
IBM Data Stream and Object Arcitectures: IOCA Reference	SC31–6805
IBM Page Printer Formatting Aid: User's Guide	S544-5284

Infoprint Manager for AIX and Windows

Title	Order Number
IBM Infoprint Color 130 Plus Installation Planning Guide	G544-5771
IBM Infoprint Manager: Reference	S544-5475
IBM Infoprint Manager for AIX: Administrator's Guide	S544-5595

z/OS Version 1 Release 2

Title	Order Number
z/OS C/C++ Programming Guide	SC09-4765
z/OS C/C++ Run-Time Library Reference	SA22-7821
z/OS Communications Server: IP and SNA Codes	SC31-8791
z/OS Communications Server: IP Application Programming Interface Guide	SC31-8788
z/OS Communications Server: IP Configuration Guide	SC31-8775
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z/OS Communications Server: IP Migration	GC31-8773
z/OS Communications Server: SNA Diagnosis Vol 1 Techniques and Procedures	LY43-0088
z/OS Communications Server: SNA Diagnosis Vol 2 FFST Dumps and the VIT	LY43-0089
z/OS Communications Server: SNA Messages	SC31-8790
z/OS Communications Server: SNA Network Implementation Guide	SC31-8777
z/OS Communications Server: SNA Operation	SC31-8779
z/OS Communications Server: SNA Programming	SC31-8829
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z/OS Information Roadmap	SA22-7500
z/OS ISPF Dialog Developer's Guide and Reference	SC34-4821
z/OS JES2 Commands	SA22-7526
z/OS JES2 Initialization and Tuning Guide	SA22-7532
z/OS JES2 Initialization and Tuning Reference	SA22-7533
z/OS JES3 Commands	SA22-7540
z/OS JES3 Initialization and Tuning Guide	SA22-7549
z/OS JES3 Initialization and Tuning Reference	SA22-7550
z/OS Language Environment Debugging Guide	GA22-7560
z/OS Language Environment Run-Time Messages	SA22-7566
z/OS Language Environment Programming Guide	SA22-7561
z/OS MVS Diagnosis: Tools and Service Aids	GA22-7589
z/OS MVS Initialization and Tuning Guide	SA22-7591
z/OS MVS Initialization and Tuning Reference	SA22-7592
z/OS MVS JCL Reference	SA22-7597
z/OS MVS Product Management	SA22-7603

Title	Order Number
z/OS MVS Programming: Authorized Assembler Services Reference ALE-DYN	SA22-7609
z/OS MVS Programming: Authorized Assembler Services Reference ENF-IXG	SA22-7610
z/OS MVS Programming: Authorized Assembler Services Reference LLA-SDU	SA22-7611
z/OS MVS Programming: Authorized Assembler Services Reference SET-WTO	SA22-7612
z/OS and z/OS.e Planning for Installation	GA22-7504
z/OS Program Directory	GI10-0670
z/OS SDSF Operation and Customization	SA22-7670
z/OS Security Server RACF General User's Guide	SA22-7685
z/OS Security Server RACF Security Administrator's Guide	SA22-7683
z/OS Summary of Message Changes	SA22-7505
z/OS UNIX System Services Command Reference	SA22-7802
z/OS UNIX System Services Messages and Codes	SA22-7807
z/OS UNIX System Services Planning	GA22-7800
z/OS UNIX System Services User's Guide	SA22-7801

CICS

Title	Order Number
CICS Customization Guide	SC34-5706
CICS Diagnosis Reference	LY33-6097
CICS Resource Definition Guide	SC34-5722
CICS Supplied Transactions	SC34-5724

IMS/ESA® Version 6

Title	Order Number
IMS/ESA Administration Guide: System	SC26-8730
IMS/ESA Administration Guide: Transaction Manager	SC26-8731

3270 and SNA Data Streams

Title	Order Number
IBM 3270 Information Display System Data Stream Programmer's Reference	GA23–0059
IBM 3270 Information Display System 3274 Control Unit Description and Programmer's Reference	GA23–0061
IBM 3270 Information Display System Reference Summary	GX20–1878
IBM 3270 Kanji Data Streams	GA18–2980

Title	Order Number
IPDS and SCS Technical Reference	S544–5312
Systems Network Architecture: Sessions Between Logical Units	GC20–1868

Index

Special Characters

Numerics

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z

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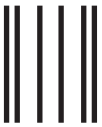

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